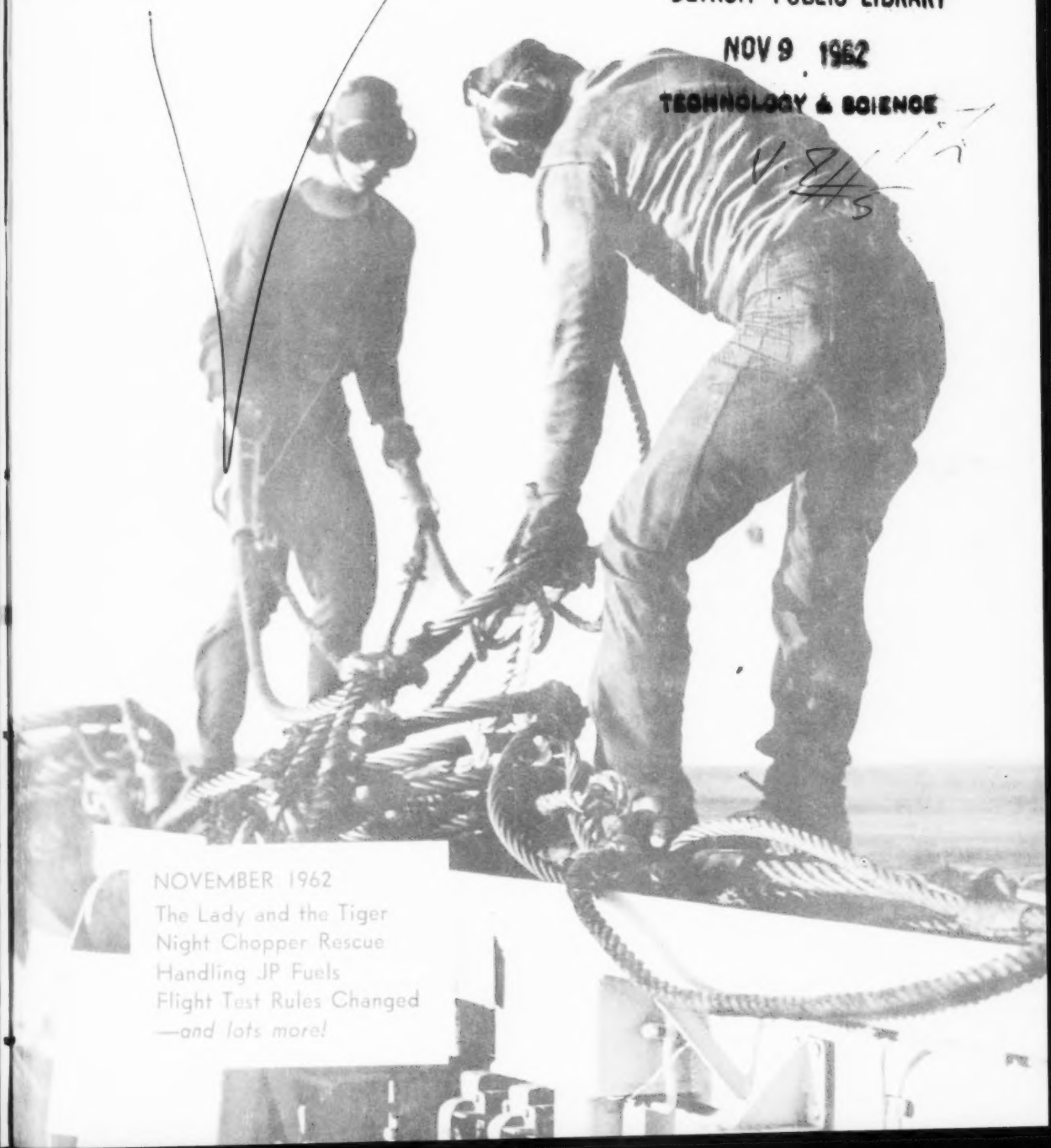
approach

THE NAVAL AVIATION SAFETY REVIEW



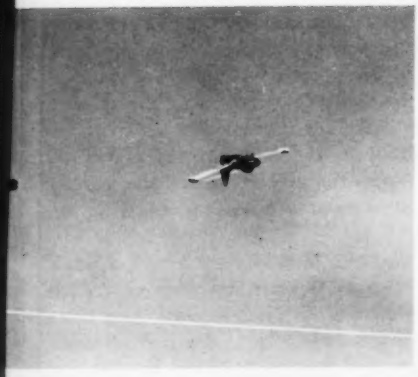
NOVEMBER 1962

The Lady and the Tiger
Night Chopper Rescue
Handling JP Fuels
Flight Test Rules Changed
—and lots more!

The act of performing an illegal maneuver requires a deliberate infraction of established regulations.

by LCDR J. R. Foster

THEY WERE JUST FOOLING



Aggressiveness is an extremely desirable trait of a naval aviator. In fact, without a fair measure of this trait a pilot's ability to cope with emergencies, obstacles and whatnot is questionable. However, a serious problem arises when this aggressiveness is expressed in the performance of an illegal maneuver rather than being directed by proper supervision and self discipline into safe and useful training.

Aggressiveness in a young aviator requires a most skillful and understanding supervisory control so its potential can be fully utilized. When the trait is undisciplined it will sooner or later result in an act of flathatting, or some other illegal or poor judgment maneuver. When this occurs the odds are that the Navy will lose a highly trained aviator, an expensive complex weapons system and perhaps be faced with a perplexing public relations problem as a result of death to others and destruction of property.

Discouragingly, flathatting continues to be a big contributor to the less definable types of aircraft acci-

dents. It requires more than just an error in skill or judgment. The act of performing an illegal maneuver requires a *deliberate infraction of established regulations.*

It is a tragic experience to brief and rebrief new aviators on the danger of yielding to the age-old thrill of "flathatting" and "showing off" only to have them turn a deaf ear to the admonitions of their more experienced supervisors. When they do so, they commit an act which has through the years proven to be dangerous and useless. Even under controlled circumstances and with proper training, the hazards of authorized low level missions are well known.

Facts and Figures

A study of records at the Naval Aviation Safety Center back to 1 July 1959 revealed 18 accidents classified as inflight *illegal* maneuver, 7 of which have occurred since 1 January 1962. Obviously the practice of *flathatting* must continue to remain a matter requiring command attention at all levels.

Because of the limited number of cases a *valid* mathematical analysis is impossible. However, some interesting facts can be pointed out. This type of accident is nearly always *fatal.* Of the 18 accidents reviewed, 16 resulted in fatalities and 15 strike damaged aircraft.

Fig. 1 compares the age of pilots involved versus number of accidents. The most significant fact of this comparison is that with the exception of two, all pilots involved in *flathatting* type accidents since 1 July 1959 were under 30 years of age. This should not be any great revelation but does point out the responsible age group.

Fig. 2 (years' experience DNA versus number of accidents) illustrates more clearly an important fact. Eight *(nearly half)* of the pilots involved in these accidents were either students (3 accidents) or had 1 year or less experience as a naval aviator (5 accidents). This very definitely indicates a period in an aviator's career when supervision, training and education can prevent him from yielding to the temptation of performing an illegal maneuver and becoming a statistic in a dusty file.

Fig. 3 plots total flight hours of each pilot versus number of accidents. This comparison shows that the majority of the pilots involved had less than 2000 hours total flight time.

The First One

An F9F-6K departed a Naval Station for an electronic gear check out with a ship in the local operating area. After remaining under the ship's control for approximately 28 minutes, the pilot was released to return to his home field. On returning the aircraft was observed to make two passes on a local public beach area, rolling to the left each pass. On its second low level pass the aircraft struck the ground in an inverted attitude at a 45-degree angle of impact.

Listed as the cause of this accident by the aircraft accident board was the flagrant violation of regulations pertaining to flight in naval aircraft. Just *three* weeks prior to this accident the pilot had attended

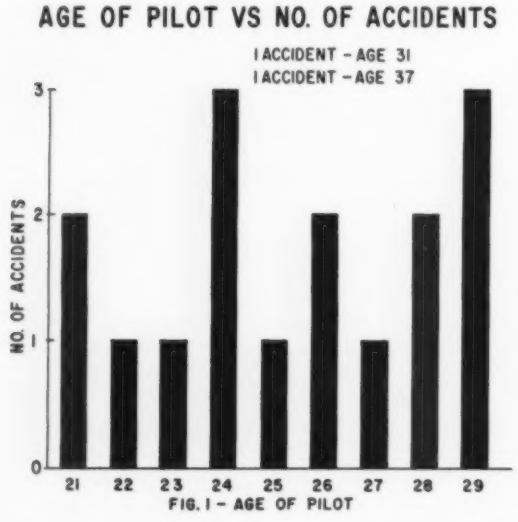


FIG. 1 - AGE OF PILOT

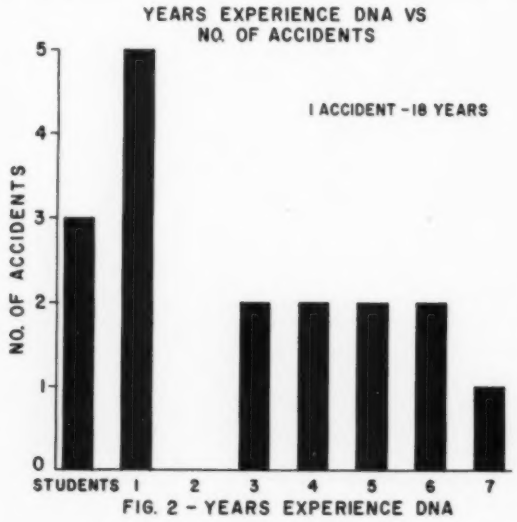


FIG. 2 - YEARS EXPERIENCE DNA

an APM during which the type commander's instruction on unauthorized and unsafe flying was reiterated. Subsequently he had signed this instruction which had been placed on the pilots' read and initial board.

The Next One

Three days later, at the same station a section of two F8U aircraft decided to put on an unauthorized airshow for the benefit of some college girls who were on vacation. Five minutes after a section takeoff and in the same general locality as the F9F crash, the flight descended to 300 feet with an airspeed in excess of 400 knots. At the completion of an Immelmann type overhead maneuver, the wingman's aircraft was observed to enter uncontrolled/spinning flight and continue into the water. The pilot ejected at approximately 200 feet but due to the vertical speed and attitude at the time of ejection, the parachute did not fully deploy. He was fatally injured.

Both pilots involved in this accident had been briefed three days prior on the type commander's instruction concerning unauthorized and unsafe flying and were admonished concerning the pitfalls of unauthorized flying by their commanding officer. Shortly after the briefing, the F9F accident described above occurred and was widely discussed by the pilots of the squadron.

In spite of warnings about the consequences and dangers involved in unauthorized flight, the pilots chose to disregard all aspects of mature professional aviation in order to impress their college girl acquaintances. Here's how the accident board said it: *"The accident probably would not have occurred if the flight leader had not abused his trust. In a momentary relaxation of this responsibility to his service, squadron and most of all, his wingman, he allowed the situation to develop that ended in a fatality and loss of a valuable aircraft."*

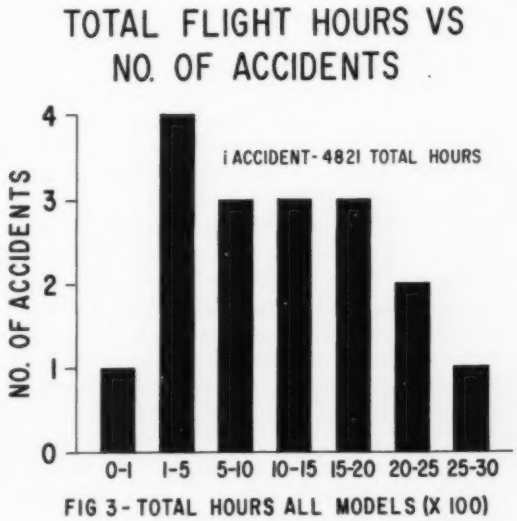


FIG 3 - TOTAL HOURS ALL MODELS (X 100)

The following remarks were made by an endorser:

"I consider the actions of the pilots involved in this accident completely inexcusable. The flight leader briefed his flight before takeoff and, premeditatedly, planned to execute an unauthorized maneuver in an area, fully understanding the consequences of his actions. With complete disregard for the safety of others, the orders of this command and the public opinion of the Naval Service, he willfully satisfied his whim to 'show off.' The flight leader is fortunate that he is still alive as, in reading his account of the action, noting particularly the speed and weight at which he entered the Immelmann, the successful completion of the maneuver was, at best, marginal. He could have very well been a participant in the funeral he helped to plan."

They were Just Fooling . . .

A young heavy attack pilot departed NAS_____ in a T-28B on a round-robin flight to pickup and return a squadron mate and friend who had completed a survival training course at an Army installation. On the return flight with his passenger, the pilot departed from his planned flight route and commenced a descent to an extremely low altitude along a large stretch of sandy beach.

The aircraft followed the general contour of the ocean frontage and was observed rocking its wings and its occupants waved at several persons along the water's edge. Finally, the aircraft was pulled up into a steep climb to approximate altitude of 200 feet, made a sharp turn to the left and descended steeply into the ocean. Both pilots were fatally injured on impact.

"As the plane passed the club the front pilot waved. The wind blast from the propeller blew sand up from the beach," stated one witness.

"We were lying on the beach when we saw the plane approaching," two other witnesses said. "It was so low that we ran up the dune for fear of being hit. The plane seemed no higher than eye level. The occupant of the rear cockpit turned and waved."

In regards to the steep left turn prior to impact the accident board stated, "It is the opinion of the board that the pilot wanted to *get a better look* at the young appearing ladies on the beach that had waved as he passed heading south. It is further felt

by the board that if this maneuver had not been attempted the flight would have landed safely at its destination."

As these indicate, a few pilots are still willing to jeopardize human lives, aircraft and private property and risk creating ill feeling toward the Navy, merely to satisfy the immature impulse to flathat. Whatever the reasons, the results are inevitably written in a needless and tragic loss to the Navy and the family involved.

This problem of flathatting is not an easy one to correct and requires a concentrated effort at all echelons. The following corrective action was set forth by a recent accident report endorser. Such a program should include:

● Complete indoctrination of all flight personnel on the inherent dangers of flathatting. This should be especially directed toward the young aviators. These words were written by RADM D. V. Gallery over six years ago while serving as CNAResTra: "The most dangerous period of any naval aviator's career is the first couple of years out of Pensacola when he knows he is the world's greatest aviator, but is afraid most other people don't."

● Wide publicity of the flathatting incidents which are reported and a diligent effort made to identify the offender.

● A firm policy of all commanding officers that clearly defines the consequences of deliberately engaging in unauthorized flight. It should be stressed that flathatting results only in death or disgrace and has no place in disciplined military flying.

Endeavor to provide all pilots with an opportunity to frequently test their skill in controlled training exercises that expend a desirable aggressiveness in accomplishing safe and useful training.

● Firm corrective action at the command level at the first minor infraction of flight discipline. Individual instances where the infractions continue require a complete investigation into the adaptability of the individual as a naval aviator.

In summary, a type commander states that the act of unauthorized low flying not only violates many regulations, Navy, Civil and International, but demonstrates *conclusively* poor judgment, lack of common prudence, and disregard for consequences of dangerous actions. Flathatting and other similar unauthorized and unsafe flying practices are intolerable. The *professional* aviator recognizes this.

If our younger aviators are to attain professional status they must be taught early in their careers, by precept and example, to refrain from engaging in unauthorized and unsafe maneuvers. ●

OPS NOTES

EXCERPTS FROM SOME OF THE NAVY'S SAFETY COUNCILS THROUGHOUT THE WORLD, WHO PROVIDE LOCAL LEADERSHIP AND EMPHASIS TO THE NAVAL AVIATION SAFETY PROGRAM.

Challenge and Reply

It has been noted that some S2F plane commanders are having their copilots complete the entire pre-start check list while they are signing out for the aircraft. This means that when the plane commander sits in the pilot seat all is ready for him to engage the starter. This system may save several minutes but compromises the Challenge and Reply System. The Board concluded that no time-saving method that jeopardizes safety can be tolerated. The chairman recommended that the Safety Officer and Assistant Flight Training Officers take immediate action to rectify this situation.—*NARTU Norfolk*

You're Invited

A recent incident pointed out the lack of understanding of the abilities and capabilities of GCI sites and RATC Centers. The 679th Air Division and the Jacksonville RATCC, both located at NAS Jacksonville, have invited all pilots in the area to be their guests for a guided tour of their facilities and have their capabilities explained. It was recommended that all squadrons take full advantage of this offer and require each pilot to visit the local GCI sites and RATCC. —*Southern Area, Jax.*

NC-5 Inspections

The Safety NCO of the Marine Detachment stressed to the committee the need for a weekly inspection of the NC-5s for auxiliary power for jet aircraft. This inspection should be conducted by the electric shop where the electrical output for the start and service change can be closely monitored. Therefore, an NC-5 not putting out the required voltage and amperes would be excluded from the jet line until repaired. Possible damage to the aircraft components due to improper voltage would thus be averted.—*NAS Willow Grove*

Command Supervision

Command supervision continues to be the dominant factor in all aviation safety programs. It is considered worthy of note that when endorsing authorities assign supervisory personnel error as an additional contributing factor to an accident report, it is not intended to put the commanding officer on the spot or criticize his efforts. Quite to the contrary, it emphasizes areas which appear to require more detailed attention, and greater assistance for the commanding officer from the unit personnel who are in a position to observe and correct unsafe practices or conditions. A sensible approach will give better results than a sensitive reaction and keep alive that fine old saying: "The life you save may be your own . . . or better still—mine."—*AirFMFPac, El Toro*

The Code of the Pilot

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"Ethics are instilled by example and by experience."

The choice is yours. You are committed to the profession of piloting aircraft with all the challenges and rewards that this implies and the obligations that you have accepted.

The meaning of "profession" according to the dictionary is a "vocation requiring knowledge of some department of learning or science." This is only a partial definition because we are concerned with professional attitudes as well as professional knowledge.

For the purpose of this discussion, we can define a "professional" as one who has mastered the knowledge required for his vocation and, in addition, is required to use independent judgment in exercising his knowledge. The aircraft pilot certainly meets this definition. He must have a specific type of knowledge; he must be able to analyze situations in the light of his knowledge and arrive at reasoned decisions on the basis of personal integrity.

Integrity is essential to professional conduct. When you visit a doctor for medical attention, when you seek the services of an engineer or architect for advice on the construction of a house, when you retain a lawyer to help in drawing a will or for other legal advice, you are placing your safety or welfare in the hands of a professional person. Where the practitioner of these various professions has established a reputation for integrity, he commands your confidence. Your selection is made on the basis of his integrity because your own knowledge is not adequate to judge the value and correctness of his advice.

His integrity and your confidence in his judgment are based on:

1. High standards required to qualify for his profession, calling for thorough educational and training process.

2. Maintenance of his proficiency: keeping abreast of new knowledge.

3. Recognition of his professional status by others who are qualified to evaluate his work.

by Jerome Lederer

Managing Director, Flight Safety Foundation

4. A tradition of individual responsibility, of intellectual curiosity and activity, of service to individuals and to society.

5. Ethical standards of conduct, self-imposed, established by the profession. This means that he must always be critical of his own acts and his competence in relation to those he serves or with whom he works.

Professionalism means to know your occupation so thoroughly and intimately that it becomes a part of your life. You feel you will never know enough about it, so you seek constantly to improve your knowledge and proficiency. In short, you wish to become a master of your profession.

Piloting modern aircraft in the service of your country, or of its citizens, has every element common to other professions.

Flying is becoming ever more exacting, requiring strict compliance with proven good practice, careful attention to detail, continuous alertness. A pilot must keep abreast of new techniques and new procedures just as the doctor, the engineer or the lawyer. As in other professions, his technical competence must also be coupled with integrity else he becomes discredited.

In several respects, military and transport piloting is a more exacting profession than the others. No other profession is subject to such frequent proficiency checks. Because of the precarious nature of his activity and his constant battle with the law of gravity, the aircraft pilot must be continually alert to any form of overconfidence, complacency, egoism, vanity, irresponsibility and impatience. In these respects, he has much in common with other professional people who deal with the safety or welfare of the public. They must also guard against the same weaknesses; however, a pilot bears a unique additional responsibility because often no other "expert" is around to check his judgment and his action at the time he makes them. No other profession requires such a combination of skill, judgment, art, with ever-changing techniques which must be mastered and the whole used in such a short allowable time.

The pilot carries high responsibility for the safety of the public just as do the other professions. The military pilot carries an additional moral responsibility—the preservation of a society.

The pilot meets every one of the demands of other professions except one.

Unlike other and older professions, pilots as a whole have not developed a written code of ethics. The doctor has his Oath of Hippocrates; the engineer, his Cannon of Ethics; the lawyer also has his Cannon of Legal Ethics. And now the aviation mechanic has a Mechanic's Creed.

A code is useful to professional people even though it may occasionally be honored in the breach because its acts as a rallying point about which members of the profession can gather to measure their competence, to uphold their integrity and to confirm their importance to society. It spurs professional progress on a high plane of activity. It creates a climate which induces high respect from the public at large, and it acts as a guide to conduct which neither legal decrees nor military dictums can supplant.

A code of ethics rests on the voluntary acceptance of basic principles of conduct by group acquiescence.

An examination of the codes, cannons and creeds of other professions shows that they have these points in common:

- Moral obligation to those they serve.
- Obligations to fellow workers.
- Rules of conduct.

The common ideals, the common traditions, the common understanding of all airmen make a code of ethics unusually desirable and applicable.

(*See inside back cover for Mr. Lederer's proposed code.*)

"Ethics are instilled by example and by experience."

The Law a

8

Under the Federal Aviation Act of 1958 military flight violations are processed against military pilots by investigating inspectors of the Federal Aviation Agency's District Offices in all those cases where available evidence is believed to support the charges of violations of the air traffic rules by military pilots, as submitted by a complainant in incidents involving military pilots (including near midair collision incidents).

by CDR F. L. Danowski

v and Flight Safety

The Federal Aviation Act of 1958 authorizes *any complainant* to file a complaint in writing to the Administrator of the FAA with respect to anything done or omitted *by any person*, in contravention of the Act.

For example, passengers aboard commercial airliners have filed complaints against the pilots of military aircraft for coming too close to them while they were passengers aboard the aircraft. The Administrator's broad powers include the authority to prescribe air traffic rules and regulations for the navigation, protection, identification and flight of aircraft, *and for the protection of persons and property on the ground.*

With the advent of radar tracking capability of most controlled airspace areas, the tremendous increase in traffic density, and the increasing demands of persons on the ground for flight safety, once carefree flight must now be superseded by the pilot's meticulous attention to air traffic rules.

In order to maintain an unblemished military record, military pilots must be truly professional in their knowledge and application of the Visual Flight Rules and Instrument Flight Rules of Part 60 of the Civil Air Regulations, of any new Special Civil Air Regulations and be familiar with the latest amendments issued to the air traffic rules of Part 60.

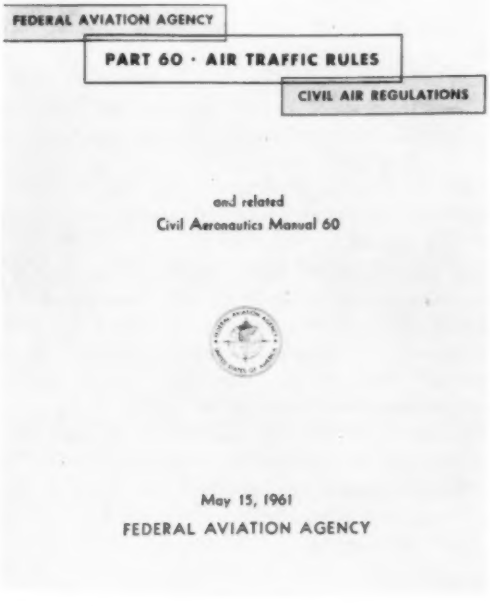
In cases of complaints *by any person* against a member of the Armed Forces of the United States acting in the performance of his official duties, the Act requires the Administrator to refer the complaint to the Secretary of the military department concerned for action. The Secretary is then required to inform the Administrator within 90 days after receiving such a complaint, his disposition of such complaint, including a report of any corrective action or disciplinary action taken.

It has been observed during the review of military flight violations that many military pilots cited for flight violations of the Civil Air Regulations are holders of FAA Airman Certificates such as an Air Transport Rating (ATR), Instrument Rating, Multi-Engine or Single-Engine Rating. Military pilots should realize that in violations processed against civilian pilots holding such civilian airman ratings, that Agency enforcement action of suspension or revocation of an airman's certificate, a civil minimum, medium or maximum penalty (fine), or a written letter of reprimand, depending upon the circumstances and the public interest in the case, are all authorized legal punishments. The military pilot's civilian ratings are protected *behind the cloak of military review and action provided for in the Act of 1958.* However, continued obvious military flight

violations by Armed Forces pilots could result in a reappraisal of the procedures for the review of military flight violations relative to these civilian airman ratings held.

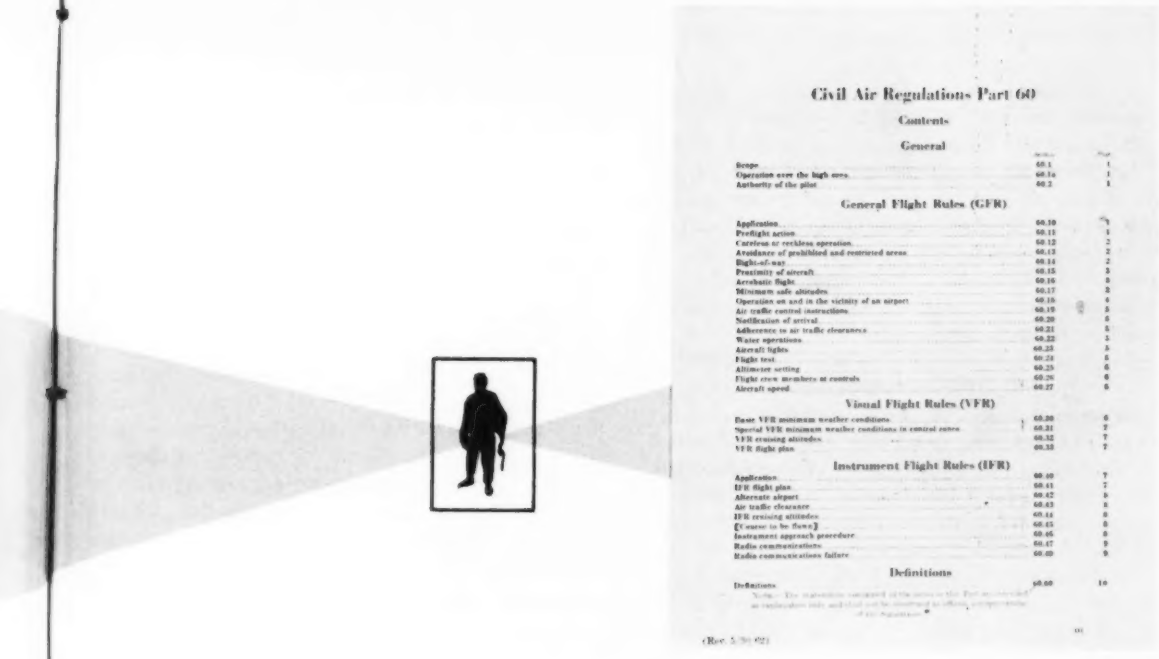
In reviewing alleged military flight violations filed against U. S. Navy pilots it has been my observation that the majority of such allegations occurred in the following areas:

- Complainant reports of near-midair collisions
- Operation of a military aircraft under an Instrument Flight Rules flight clearance
- Operation of a military aircraft at less than 1000 feet above congested areas
- Operation of a military aircraft in controlled airspace under Visual Flight Rules when the weather was below basic VFR minimum weather conditions
- Operation of a military aircraft in prohibited airspace or in restricted airspace without a clearance from the controlling authority
- Operation of a military aircraft on and in the vicinity of an airport.



Isolated cases of a pilot's failure to maintain the correct VFR cruising altitude above 3000 feet for the direction of flight, properly close out a VFR flight plan, maintain radio communications within controlled airspace and to comply with the Los Angeles International Airport Traffic Pattern Area Rules have been reported. The relative precedence of the foregoing may vary, depending upon the number of cases considered.

The following Special Civil Air Regulations affect Part 60 and are ultimately binding upon military pilots: (SR 421C) Positive Air Traffic Control Areas and Positive Air Traffic Control Routes: (SR 438) Los Angeles International Airport Traffic Pattern Area Rules; (SR 442) New York International Air-



Civil Air Regulations Part 60

Contents

General

General Flight Rules (GFR)

Visual Flight Rules (VFR)

Instrument Flight Rules (IFR)

Definitions

(Rev. 5/30/62)

port Traffic Area Rules; (SR 444) Jet Advisory Areas; and (SR 445) Reports of Navigation and Communication Equipment Malfunctions. By focusing the pilot's attention on these areas, in conjunction with frequent and regular review of the "Rules of Airspace" much can be done to drastically reduce military flight violations that just never should have happened.

With respect to the failure to properly close a filed VFR flight plan, the functions formerly performed by Military Flight Service have been assumed by the FAA's Flight Service Stations. Every pilot who files a flight plan is required to file, on arrival at his destination, a "Notification of Arrival" (CAR 60.20) with the nearest FAA communications station or control tower. The Airman's Guide urges all pilots to file these reports with the Flight Service Stations. Failure to do so may result in the pilot being cited for a violation of CAR 60.20. Past instances have indicated that merely asking someone at the non-military destination airport to close you your VFR flight plan is no insurance that this will be done. To be sure, file a written notification of arrival or call the FAA Flight Service Station collect.

Careless or Reckless Operation

Most often alleged to Navy pilots is violation of CAR 60.12, which states "No person shall operate an aircraft in a careless or reckless manner so as to endanger the life or property of others." This was usually associated with an alleged violation of some other Civil Air Regulation such as, "Proximity of Aircraft" (CAR 60.15), "Minimum Safe Altitudes" (CAR 60.17b), "Operation on and in the Vicinity of an Airport" (CAR 60.18), "Basic VFR Minimum Weather Conditions" (CAR 60.30), or directly alleged by a complainant in reports of near-midair collisions. When a near-midair collision was alleged it was usually associated with CAR 60.15, "Proximity of Aircraft" or CAR 60.14.

A typical illustration of an alleged violation of CAR 60.12:

A military jet fighter aircraft operating singly was observed making low altitude runs over the classroom buildings on the edge of the campus of a university. The extremely low altitude of the jet aircraft over the telephone wires on the perimeter of the campus strongly supported the belief that this pilot had been here before. On a subsequent pass over the same area an alert student photographed the jet aircraft ap-

proximately 100 feet over the telephone wires. When enlarged, there for all to see was the aircraft and identifying numbers. Armed with this evidence, the irate community pressed for action and the incident received prominent local press coverage.

The pilot was cited for violation of CAR 60.12, "Careless and Reckless Operations." In applying the law it was also evident that the pilot also violated CAR 60.17b, "Minimum Safe Altitudes." This particular episode damaged the prestige of a military service, to say nothing of the hazard the pilot created to persons and property on the surface and the threat to his own safety.

Air Traffic Clearances

The second regulation most often cited was CAR 60.21, "Adherence to Air Traffic Clearances," which in some cases was alleged along with CAR 60.19, "Air Traffic Control Instructions." Another sensitive area is illustrated by a pilot entering a Control Zone on a VFR flight plan when the ceiling and/or visibility was below minimums (CAR 60.30) which may also have involved poor Preflight Action (CAR 60.11). Isolated cases were reported of a pilot entering a prohibited area or a restricted area without clearance from the controlling authority (CAR 60.13).

Here is another typical example:

The instructor pilot of a military jet aircraft was a safety pilot for a student pilot completing a hooded GCA in VFR weather conditions to the airport at a naval air station on the West Coast. He saw no other aircraft during this VFR GCA. However, a Cessna 150 instructor pilot filed a Near-Midair Collision complaint against the pilot of this military jet aircraft which he and his student identified as it overtook them from behind and approximately 100 feet above. The radar controller's statement placed the military jet aircraft at the scene at the time of the reported near-midair collision. Although the military jet aircraft was under radar control, the Cessna 150 was not detected. In failing to give way to the Cessna 150 he was overtaking in the GCA pattern, the military jet safety pilot was also cited for careless operation of an aircraft, and proximity of aircraft.

In applying the law it becomes evident that the outer half of the GCA pattern is outside of positive controlled airspace. Although the Cessna pilot did not use good judgment in transiting this area at an altitude of 1800 feet, he did not violate any rule. On the other hand, the pilot of the military jet aircraft was preoccupied with his student GCA and believed the GCA radar would keep him informed of other targets. In VFR weather conditions, even though under some type of positive air traffic control, it is the pilot's responsibility to provide his own separation from other aircraft. Although primarily cited for a violation of the Right-of-Way rule (CAR 60.14), the military pilot was also charged with Careless and Reckless Operation (CAR 60.12) and Proximity of Aircraft (CAR 60.15).

An incident such as this certainly is not intentional on the part of the military pilot. However, continued recurrence of such incidents do reflect a pilot's lack of awareness, a lack of training, a lack of knowledge of the Civil Air Regulations, or an incorrect application of the air traffic rules. No doubt such incidents can be duplicated many times from Navy files. Rather than completely hiding behind the "Administratively Restricted" cloak, it is time for certain violations to be openly discussed, but in an anonymous manner. Only by such an education program can military pilots become more aware of somewhat unknown regulations, and conduct themselves accordingly.

A typical fallacy among many pilots operating under instrument flight rules at an assigned altitude during VFR weather conditions, is the belief that any aircraft climbing, descending or crossing through this altitude should remain clear of their aircraft. They acquire a false sense of security that they were cleared to this altitude by Air Traffic Control and develop a tendency to be less vigilant of other VFR traffic. This situation continues to be repeated time and again and the impression still persists even though the note under Civil Air Regulation 60.30 says the following: "When operating in weather conditions equal to or above the basic VFR minimum weather conditions specified in Section 60.30 of Part 60 of the Civil Air Regulations, irrespective of the type of flight plan an aircraft may be operating under, ie., *IFR* or *VFR*, the primary responsibility for the avoidance of collision rests with the aircraft pilot."

I believe it is time to reacquaint our military pilots with the Air Traffic Rules of Part 60 of the Civil Air Regulations covering VFR as well as IFR flight and with the latest amendements to these rules, including the Special Civil Air Regulations. Of particular interest is published Amendment 60-24 to Section 60.18 entitled, "Airport Traffic Area Rules." This amendment became effective 26 December 1961 and established more detailed requirements for operating aircraft on and in the vicinity of an airport. To ensure that our pilots maintain their knowledge and cor-

Ten Commandments of Airspace

1. Thou shalt be vigilant to observe other traffic, most especially under instrument flight rules, lest thou precipitate a near-midair collision, and be tagged with careless or reckless operation.
2. Thou shalt conduct thorough and meticulous preparation, whether for visual or instrument flight, lest thou be guilty of poor preflight planning, and fade from the "professional" ranks.
3. Thou shalt avoid Prohibited Areas, and Restricted Areas of course, unless the controlling authority has cleared thee over or across.
4. Thou shalt adhere to the Right-of-Way rules, whether climbing, descending or cruising; and alter thy course when passing, to obtain clearance distance of thy choosing.
5. Thou shalt adhere to thy air traffic clearance, and air traffic instructions of course, unless thou hast cleared with Air Traffic Control, to ever veer left or right of thy course.
6. Thou shalt avoid proximity of aircraft, especially with passengers for hire, except by proper pre-arrangement, thus avoid collision and ire.
7. Thou shalt avoid dangerous acrobatics, over airways, persons and towns; most especially in low visibility, and 1500 feet over the ground.
8. Thou shalt maintain the minimum altitude; over water, over city, anywhere; near persons and property below thee; and safeguard those in thy care.
9. Thou shalt observe the rules at the airport, by voice, by flare, by light; and maintain the sequence in landing, and be safe with all thy might.
10. Thou shalt maintain two-way communications, under visual or instrument flight, or voice an emergency instruction, and seek assistance to correct thy plight.

rect application of the "Rules of Airspace" we should provide in our training programs a regular and frequent review of all pertinent Civil Air Regulations of Part 60(Special Civil Air Regulations and the latest amendments affecting military pilots. Achievement of this goal will materially reduce report of incidents, near-midair collisions and flight violations involving military pilots and result in achievement of the truly "professional" military pilot.

One additional point. Section 60.2 "Authority of the Pilot" specifies that the pilot has final authority for operation of his aircraft and provides the pilot with a means of deviating from the air traffic rules, in the interest of safety, *provided he files a written report of such deviation.* This is commonly referred to as the "Pilots emergency authority." From careful observation of cases, military pilots have been quite reluctant to invoke this authority when confronted with an emergency situation which requires such deviation from the rules. The rule was published to protect the pilot—use it.

As a general rule, Air Traffic Control will not talk the pilot into declaration of an emergency. It remains for the pilot to declare an emergency at the time of the incident. Previous hesitancy to declare an emergency appears to result from the anticipated embarrassment to the pilot relative to the circumstances surrounding the incident. But any such embarrassment, actual or imagined, is easily forgotten and cannot compare to the stigma of a military flight violation recorded in a pilot's otherwise perfect service record.

Commander Danowski wrote his article while attached to the Safety Regulations Division, Flight Safety Staff Accident Branch of the FAA. He graduated from Purdue University in 1941 and some of his past duty stations include Bombing Squadron 132, Meteorological Squadron 3, FAETULant, Naval Aviation Safety Center, USS VALLEY FORGE (AirOps Officer) VW-15 and VW-13 CDR Danowski is presently attached to the Secretary of the Navy's Council of Personnel Boards in Washington, D. C.

ANGLE OFF

Configuration of an A4D at the time of landing was gear and flaps down, speed brakes out. Wind was 55 degrees from the left of runway heading at 5 knots gusting to 10. The flaps were left down and rollout was normal until the A4D had traveled several thousand feet. At that time the port wing lifted and a right swerve began.

Left rudder and brake smoothed out the swerve but the plane had eased off the right side of the runway and was approaching the chain arresting gear. Still tracking slightly to the right, it straddled the chain for a few moments then the port wheel hit and broke off from impact with the links.

A violent swerve to the left put the aircraft on the port side of the runway, stopping 60 degrees to the left of runway heading.

Failure to raise the flaps upon landing and the crosswind characteristics of the A4D were blamed for the incident; however, the interval between "Rag" training and reporting to the squadron (three months) was considered excessive and may have had some bearing on pilot efficiency.

Alphonse & Gastone

"I thought *you* had it!", continues to be a source of cartoon humor but it also continues to be a potential hazard

whenever two pilots get together in a bicycle-built-for-two. An F8U pilot (with 3000 total hours) was scheduled for the front seat of a TV-2 on a scheduled fam and instrument flight. Another squadron pilot was acting as "check pilot." Their narratives of the incident tell how a misunderstanding allowed an uncontrolled descent.

Front seat pilot: "After completing about 15 minutes of actual instruments at 34,000 feet we returned to VFR flight and I requested an aerobatic checkout. The pilot in the back seat answered in the affirmative and commenced a discussion of starting speeds for various maneuvers. At the same time the aircraft nosed over in a dive and I assumed he had control of the aircraft. I was expecting him to commence a maneuver."

Rear seat pilot: "I agreed to some aerobatics and proceeded to explain the various airspeeds used for some typical maneuvers. While going over the airspeeds I noted we were starting to let down and assumed the pilot up front was going to a lower altitude in order to do the aerobatics. A few seconds later I glanced at the airspeed indicator and saw we were at about .79 Mach. I immediately pulled off the power and lowered the speed brakes. The aircraft went through limit Mach and experienced moderate vibrations.

"We leveled off and I checked the wings visually. The plane seemed to be okay so we continued the hop. After a few rolls and a loop I noticed the port aileron had some wrinkles on the top surface. I called his attention to this and we decided to return to base.

"While taxiing in to the line I mentioned to him that I felt bad about not reminding him of the limiting airspeed of the TV since he was used to the high speeds of the F8U. He replied that he was aware of the limiting speeds and thought that at the time the incident occurred I had been flying the aircraft and was about to demonstrate a loop. I replied that I thought he was flying it and was letting down from altitude."

Wonder who made the landing? ●

Rag Dragger's Lament

Not-so-random thoughts on a tow target mission:

Now morning—still dark. Cold. Clammy flight suit. Quick breakfast.

Tow banners again . . . same old briefing. "Thirty-thousand feet gunnery. Don't get sucked; only squares shoot at square banners."

Preflight aircraft. Bird ready, escort ready. Takeoff.

Clouds mostly broken . . . overcast some places. Up through a hole. On top . . . pretty sunrise. Flight joined . . . level angels thirty. "Cleared to commence gunnery pattern. The range is hot."

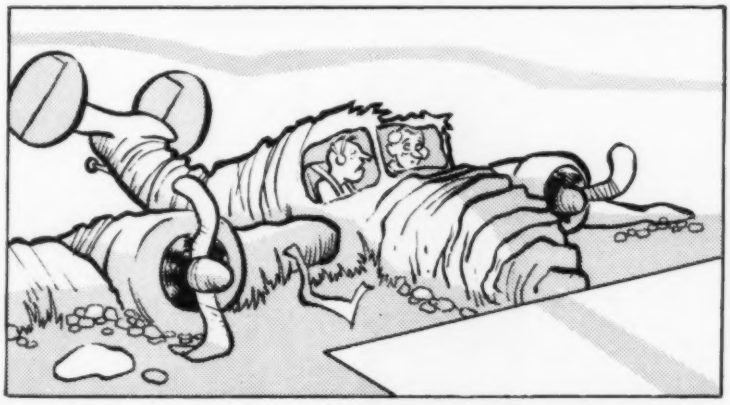
Blinding sun. Good pattern going. THUMP! Banner shot off? Fire warning light! . . . Power off . . . Fire warning light off Hummmmm . . . banner still in tow. Drop banner. Instruments normal. Land. Nearest field? Glide. Mostly overcast. Escort joined. "Negative, escort, it is not normal to stream fuel and hydraulic fluid."

Utility hydraulic pressure failing. Down through a hole.

The field! Precautionary approach. No utility pressure; blow gear down. Long way to the runway—won't make it. Need power! Power on. Fire warning light on. Power off. Almost there.

Can't make it. Too late for ejection—gotta ride it out. Short landing. Bounce. On runway. Stop the bird. Crawl out. Still in one piece. "Lookit the fuel and hydraulic fluid spouting out." Two 20 MM holes, one in aft tank! Broken hydraulic lines.

Rather fortunate. Could have exploded. Could have crashed. Could have ejected . . .?



"You realize, of course, this means a DOWN on your low approach technique."

Several recent accidents have led to the conclusion that many times the Aviation Severe Weather Forecasts and the In-Flight Weather Advisories issued by the U. S. Weather Bureau and utilized by flight briefing weather units are taken too lightly and at times, disregarded. This article outlines the Severe Local Storm Forecast and Warning Service and the In-Flight Weather Advisory Service.

AVIATION SEVERE

Aviation Severe Weather Forecasts for the continental United States are prepared by the SLS (Severe Local Storm) Center in Kansas City and distributed to the various U. S. meteorological agencies via the FAA Weather Teletype Service "A". These forecasts are intended primarily for aviation interests and to assist weather service offices in providing service to aviation. Severe weather forecasts are issued when conditions are expected to equal or exceed any of the criteria itemized below:

Severe thunderstorm: Frequent lightning and one or more of the following:

(a) Sustained localized surface wind or gusts greater than 49 knots.

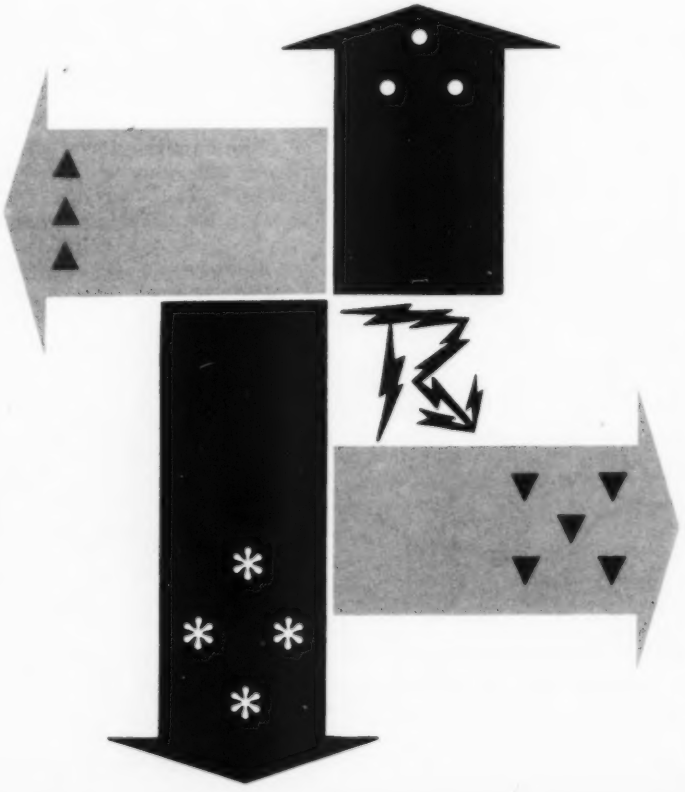
(b) Hail of three-fourths inch diameter or more (surface and/or aloft).

(c) Extreme turbulence (as defined in OpNavInst 3140.50).

Tornado: Severe weather forecasts that mention expected tornadoes imply that thunderstorm activity, usually severe, is also expected.

Numerous—more than 45 percent coverage along the line, or in the area.

Aviation Severe Weather Forecasts are generally issued for any given area in the continental U. S. six hours in advance of the expected severe weather and confined to approximately 10,000 square miles. Each forecast contains a statement indicating the period for which it is valid and will continue in effect until expira-



Wx FORECASTS

tion of the valid period, or cancellation.

The purpose of the In-Flight Weather Safety Service program is to give airmen in flight advance notice of impending weather developments or trends that are not potentially hazardous. In-Flight Weather Safety Service advisories also serve as an aid in preflight weather briefing by pinpointing for the briefer the most critical weather developments for the next two to four hours.

In-Flight Weather Advisories are designated as SigMet (Significant Meteorological Conditions) (for all aircraft) and Advisory for Light Aircraft (aircraft 12,500 pounds gross and less) and are distributed on Service A to FAA ARTCC (Air Route Traffic Control Centers) and FSS (Flight Service Station) facilities for serving aircraft in flight. ARTCC makes alerting broadcasts on all frequencies serving sectors which have IFR traffic, and FSS broadcasts the advisories at frequent intervals on navaid voice channels for use by both IFR and VFR flights.

Sigmet advisories will be issued concerning weather of such severity as to be potentially hazardous to transport category and other aircraft, specifically:

Tornadoes

Lines of thunderstorms (squall lines)*

Hail 3/4" or more

Severe or extreme turbulence (OpNavInst 3140.50)

Heavy Icing

Widespread dust storms/sand storms lowering visibilities to less than two miles.

Advisories for Light Aircraft will be issued concerning weather of such a degree as to be potentially hazardous to light aircraft, specifically:

Moderate icing

Moderate turbulence

The initial onset of phenomena producing extensive areas of visibilities less than two miles or ceilings less than 1000 feet and

Winds of 40 knots or more within 2000 feet of surface.

In-Flight Weather Advisories are generally issued two hours in advance of the expected onset of any weather condition considered potentially hazardous to aircraft in flight. The time interval between issuance of the advisory and its expiration time should not exceed four hours FAA flight service facilities will broadcast the advisories only during times within the validity period.

On VFR as well as IFR flights, pilots should guard the voice channel of VORs. This is very important in order to secure flash weather advisories, scheduled weather broadcasts or emergency instructions applicable to all aircraft. Often the first indication of UHF failure is a call to the aircraft on the VOR frequency. If two-way communications are lost, either because of transmittter or receiver failure, attempts to establish contact with the aircraft will be made over the VOR facility closest to the estimated position along the proposed route of flight. By monitoring the aural signal of VOR navigation frequencies, pilots not only will avail themselves of the In-Flight Weather Advisories, but will receive destination weather well in advance of arrival. ●

*Ordinarily, advisories are not issued in the case of scattered, unorganized air-mass thunderstorms and their associated turbulence since these storms are readily circumnavigable. Exceptions to the foregoing occur in the vicinity of multiple major airports in metropolitan areas and in mountain passes or valleys where such a storm may seriously affect flight operations.

Flight Hazards From . . . *ICING*

External icing (impact, rime, clear, . . .) is most probable when flying in air with visible moisture (cloud drizzle, rain, or wet snow) and at temperatures from 32°F to 20°F. Even in air temperatures as low as —30°F, there are many known cases of encountering heavy icing when flying in such supercooled moisture conditions. Depending upon the degree and form of moisture present, and upon the air temperature, ice accretions on an airplane's wing and other external surfaces may form slowly or with alarming and dangerous rapidity.

The basic and critical icing hazards in flight are:

• *Icing of outside pitot/static pressure sources and venturi units.* This grave situation can cause erroneous airspeed, altimeter, rate of climb, direction and attitude indications.

Whenever the pitot or static pressure sources or lines freeze fully or partially, the airspeed, altimeter, and rate of climb instrument indications will no longer be correct. This situation can cause the pilot to exceed the airplane's limitations unknowingly, to break up the airplane in flight, or to fly unknowingly into the ground.

Those airplanes that utilize an outside venturi unit to provide power for vacuum-driven gyros, and which are located within the engine's exhaust gases, are very susceptible to ice accretions on the venturi tube. This in turn reduces the vacuum and the gyro will no longer give accurate attitude or direction indications. (The pilot must have at least one properly functioning gyro instrument to maintain flight control on instruments.)

• *Accumulation of dangerous ice loads on the wing and tail surfaces.* This situation changes the airflow and reduces the available life while increasing the load the wing has to carry. It can also jam flight control surfaces if the buildup occurs near hinge points or between fixed and movable flight surfaces. In extreme cases, the combined effects of ice load and loss of lift will force a plane down. Further, the wing will stall out at considerably higher than normal stall speeds.

• *Accumulation of ice on propeller surfaces.* This situation creates a serious vibration problem and a loss of propeller effectiveness. The first indication to the pilot of propeller icing will be cycles of increasing vibration, followed by a sudden vibration increase as the ice from one propeller blade breaks free, followed by a period of vibration-free operation after all ice is thrown free from both propeller blades. The situation also causes a decrease in airspeed at a constant altitude and throttle setting.

• *Carburetor icing and air intake clogging.* Either condition results in loss of power. Carburetor icing is more difficult to control at high altitudes. This is because the available heat to cope with any icing is considerably less at altitude than at sea level for airplanes with nonsupercharged engines. At sea level engine can only develop approximately 75 percent power with full throttle at 8000 feet. Available carburetor heat may be reduced to an even lower percentage of that which would be available near sea level.

Carburetor air intake icing is usually the result of snow or sleet impinging on the intake screen. Such an ice buildup starves the engine for air. Carburetor air must then come from some alternate protected source to maintain power.

• *Windshield icing.* The loss of windshield visibility from icing is most hazardous to the pilot when attempting an approach and landing. An openable window to see forward or a means for de-icing the windshield is needed to provide the necessary forward vision at such times.

• *Radio and pitot mast icing.* Ice buildup on these masts can create air disturbances and bending loads for which they may not have been designed. If so, the mast may bend or break off. It is also possible for the "runback" from a heated pitot tube to freeze and cause an ice buildup on the mast that can adversely affect the air flow functioning of the pitot and static pressure system.

There are also two other possible icing hazards, namely: *impact* or *runback*, freezing of

(a) the controls for the carburetor air preheater and the throttle, and

(b) a fuel tank vent becoming clogged with ice which would in turn cause fuel starvation. Fortunately, these two hazards do not seem to materialize very

often. Frequent checking of the throttle and heater controls for freedom of movement is a method of knowing that they remain operative. If fuel starvation does occur from vent icing, switching to an alternate tank may provide power for a limited time, or if a common vent line is accessible to the pitot, it may be possible to sever it to provide an emergency vent.

Operational Practices

As can be readily seen, icing protection is needed for all of the above areas that are vital in maintaining flight control in any actual icing condition while flying on instruments. The degree of protection is dependent upon the amount and rate of ice accretion with which the de-icing or anti-icing equipment can cope. At best, the de-icing equipment that is usually provided on current models of non-air-carrier airplanes cannot be expected to cope with heavy or prolonged moderate icing conditions. The latter can be expected to tax the equipment beyond its capacity.

Should a pilot find himself in icing conditions without full de-icing equipment, his primary concern should be to use the equipment he has and to get to non-icing air as quickly as is safe. The following basic operational practices or flying habits should be observed:

Avoiding Conditions Conducive to Icing.

• Monitor closely all weather reports in the vicinity, paying close attention to temperatures at the ground and any reported or forecasted icing conditions aloft. A 3°F to 4°F temperature drop per 1000 feet above the ground may be used to approximate temperatures of flight altitude above ground stations, if unknown.
• Monitor closely the outside air temperature gage for temperatures favorable to external icing.

Follow a plan of safe evasive action which utilizes the following principles:

1. In clouds not near a cold or warm front, a lower altitude—if altitude permits—is usually warmer and any accumulated ice will melt. A higher altitude is usually colder and the visible moisture will likely be in a frozen state which cannot cause any further ice buildup. Any accumulated ice will gradually sublimate (vaporize) when getting into dry colder air.

2. In freezing precipitation near a warm front, a higher altitude will usually be warmer (warm air usually overruns cooler air near the ground). If at sufficient altitude, it may also be possible to descend into warmer air near the ground with non-icing conditions.

3. In clouds or precipitations near a cold front, advantage may be taken of the difference in temperature ahead of and behind such a front and the tendency of the cold mass of air to wedge under the warmer air ahead of the front. Thus going towards a cold front in temperatures conducive to freezing, a higher altitude will likely avoid icing both ahead and behind the front.

Flight speed and attitude indications should be closely watched and doublechecked. Cross-checking the artificial horizon or attitude gyro instrument with the airspeed indicator and the altimeter is a means of making certain that ice is not affecting the accuracy of airspeed/altimeter/rate-of-climb indications. Maintaining a basic attitude is essential to avoidance of a stall or excessive flight speeds. Cross-checking an electrically operated gyro is also a check on the accuracy of their indications.

Emergency Icing Conditions

If an ice load is accumulated that makes climbing to a higher altitude difficult or maintenance of altitude impossible, an emergency descent is mandatory and flight control must be maintained with primary emphasis given to airplane attiude and keeping a safe flight speed above the airplane's higher stall speed with such an ice load. If a landing is necessary, such speed must be maintained to touchdown.

In an emergency while flying on instruments, the pilot should rely on:

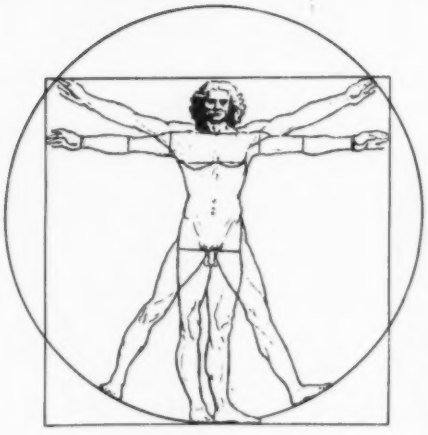
1. The attitude or artificial horizon gyro instrument to avoid a disastrous dive or stall;

2. The turn indicator, directional gyro, and attitude gyro to keep the airplane from entering a disastrous spiral; and

3. Breaking out the glass in the altimeter or rate of climb instrument to get an emergency alternate static source which will give approximate altitudes, rates-of-climb or descent, and airspeed indications when the normal static pressure source has frozen.

In summary, pilots should avoid all heavy and moderate icing conditions, proceed with caution into areas where light to moderate icing is forecast, and *should not engage in any instrument flight in air conducive to icing without having full de-icing equipment for the items vital to the maintenance of flight control.* The vital areas of concern are: (1) speed, attitude, direction instruments that are dependent on the pitot/static pressure systems and venturi gyros, (2) wing and tail surfaces, (3) propeller surfaces, (4) carburetor air fuel mixture and air intake, (5) windshield forward visibility, and (6) any radio or pitot tube masts that may be seriously affected by any ice buildups.—*Adapted from FSF Inc.* ●

the human factor



important

By Dr. Clifford P. Seitz
Chief, Human Factors,
Grumman Aircraft Engineering Corp.

Human factors engineering as a professional endeavor emerged early in World War II. The development of vastly complex military equipment and the necessity to train large numbers of men in the efficient use of that equipment required a new look at the man-machine relationship. Wars were not fought by machines but by men using them. Because machines were getting more complex, it became of primary importance, if military effectiveness was to be achieved, to scientifically exploit the human being and the equipment he used to increase the efficiency of both. By World War II, psychologists in industry and government had already made valuable contributions to the training and selection of the men who were to operate the machines.

The objectives of human engineering are not new. They are, in fact, as ancient as man himself. Primitive man shaping a club for a fellow tribesman utilized the "H" Factor. The selection of shape and length, the balancing of bulk, the carving of the grip for another man's utility and comfort was an act of designing for human use—a good definition of human engineering.

The purpose of today's human factors specialist is generally the same: To assign jobs appropriately to man or machines, to do things more safely and efficiently, to economize on time and work, to create comfort and ease, to improve and simplify equipment and to develop man-machines systems based on a full understanding of man's limitations and capabilities.

In the past, progress in designing for human use was primarily the result of trial and error, of experience slowly accumulated in eliminating and selecting the useful from the extraneous. Many devices, instruments and hand tools, such as the hammer, have evolved to a point where little need be done to improve them.

But although modification through use may in time provide satisfactory products, this is not acceptable today. The necessities of modern technology demand more than a casual and haphazard evolution toward ultimate design. To telescope the process of getting the best out of a man-machine combination, the talents and skills of a wide variety of professional disciplines are called upon.

Human factor is no longer the casual consideration of man in relation to tools and the environment in which he lives. Rather, it is the intense application by qualified professionals of scientific principles in mating man and machine. It considers the task he can perform, his accuracy, workload, failure, potential training required, motivation, comfort, fatigue, environment and performance under stress.

Human Factor

It recognizes that man is best at detecting small amounts of light, receiving and organizing small amounts of light and sound, modifying his responses to meet the demands of the situation, storing large amounts of information for long periods, reasoning inductively, exercising judgment, developing concepts and new methods.

Machines are best at quickly responding to control signals, applying large amounts of force smoothly and precisely, performing repetitive tasks for long periods, storing information briefly and erasing it, performing large amounts of computation very rapidly, performing many functions simultaneously.

Utilizing the vast body of existing information about human capability, the human factors specialist, in cooperation with engineers, designs equipment which allows man to perform at peak efficiency in operating and maintaining complex machines in a hostile space environment. The task may be steering a hydrofoil ship at high speed in a turbulent sea or navigating a vehicle on the moon from a control station located on the earth.

The most recent buyer of human factor service is the space vehicle designer. He, over all others, recognizes the important part man plays in successful space ventures. He insists on the same reliability in "man" tasks, 99.9 percent, as he requires for the machine elements.

Because of the vast news coverage of Col. Glenn's orbiting flight, we are all familiar with the design attention given to life support systems in *Friendship Seven*. In reporting to the Committee on Aeronautical and Space Sciences of the Senate, Col. Glenn made special not of man's importance in space operations. He said, "I think that maybe in the future, we will probably be able to put less automation into some of our (space) machines than was included on the Mercury design."

What to put on board, as in the case of aircraft design, is easier said than done. It takes a great deal of analysis and appreciation of the physical and psychological characteristics of man and often requires research before the operators' stations can be designed and the entire machine configured for easy maintenance.

Such a research problem arose when Grumman decided to take a look at the design requirements for a lunar vehicle. Lunar exploration may be done remotely in the first stage. A man would control the roving vehicle from a control station on the ground. We knew that steering a lunar vehicle remotely through a TV link would be difficult because the operator would have to wait 2½ seconds (the time it takes to send and receive the signal) after he moved his control, to see what happened. Can you imagine steering your car along the road,

knowing not where you are now, but only where you were 2½ seconds ago? The answer for different speeds and for courses of varying difficulty had to be found.

To stimulate some of the conditions of driving with a delay, a jeep was modified for operation and close circuit TV. The camera-armed jeep sent signals back to a van when an operator monitored a TV receiver and controlled the vehicle—or at least as much control as is possible with a 2-½ second time delay.

A total of 56 subjects drove the jeep (viewing the driving course through the television link) up to the maximum speed of 12 miles per hour without difficulty when there wasn't any time delay. When the 2-½ second delay was introduced, it became impossible to control the vehicle at speeds above 2-½ miles per hour even on the simplest course. We know now that a lunar vehicle must be operated very slowly on the moon. Obviously we desire to move faster, so Grumman is studying ways to improve operator performance. The relocation of the TV camera, the type of control and provision of a predictor display are changes in design currently being investigated which should increase the speed at which a lunar vehicle can be driven. Even after these characteristics of the vehicle are tied down, much more difficult ones involving perception of distance and judgment of the size of objects in an unfamiliar (lunar) environment must be investigated.

The "H" factor has been even more important to aircraft than it has become to the space craft, or will to the unmanned lunar vehicle controlled from earth. Since the days of the Wright Brothers, aircraft cockpit instruments have been a collection of mostly single variable displays of the "boiler gage" variety. In the beginning a pilot was a carefree soul who flew by the seat of his pants and depended primarily upon his own vision, some pedals and a joy stick. More often than not, he ignored the few gages in his open cockpit.

Today's pilot, however, faces a nearly overwhelming bank of instruments designed to keep him informed of his location and the operation of the many systems in his aircraft. His airplane is larger, faster and vastly more complex. He must fly through weather that years ago would have kept him on the ground. He depends upon mechanical devices and displays which represent the real world symbolically and from these synthesizes a picture of the relationship of his aircraft and the earth below. His reaction time in the control of his aircraft must be swift; his decisions, sound. Faced with the mass of visual information which surrounds him in the cockpit, it is not surprising that systems failure sometimes causes him to err.

One of the ways to reduce the burden on the pilot is to combine the information from this vast array of gages and present him with integrated information. In reviewing alternate ways to do this, one is impressed with the simplicity of flying when the world is seen through the windscreen. A cockpit display representing such a visual similarity, or "analog," is currently being integrated into an aircraft by GAEC. Research and flight test has shown that such a display is much easier to use, requires less training to reach a high level of proficiency and less practice to maintain proficiency. In addition, there is reason to believe that a world analog inspires pilot confidence.

Original work on this "World Analog Display" concept was done at the Naval Training Devices Center at Port Washington, N. Y., by Commander George Hoover and the author in 1946. Supporting research on this subject has been sponsored by the Defense Department since that time under the code name ANIP (Army-Navy

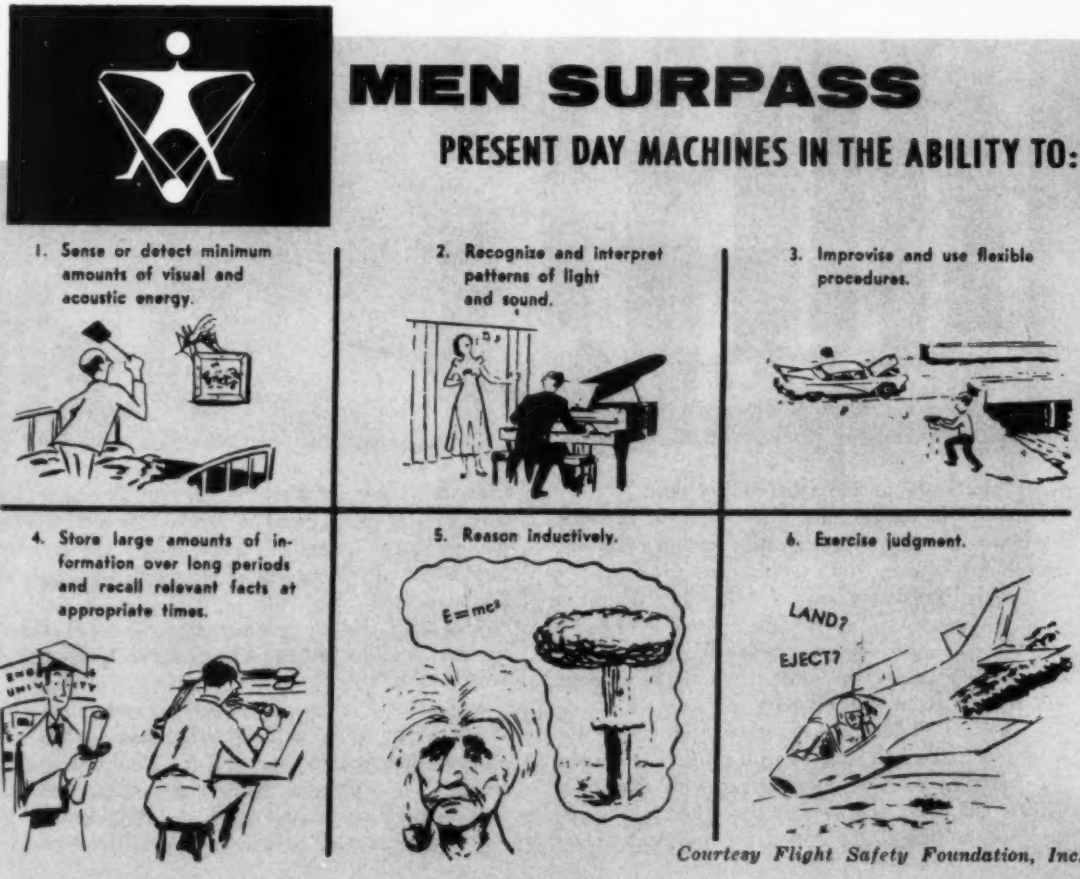
Instrumentation Program). Grumman has refined the concept and extended it from a limited navigation display to an accurate, full mission display used in takeoff, climb, cruise, attack, return and landing modes.

But just what information should go into such a display? Analysis suggested requirement for two displays, one to depict the "vertical" situation as the pilot would see it through his aircraft window and a second to show the "horizontal" situation directly below his aircraft. This kind of visual information, which the pilot would normally gather on a clear day by looking through his windshield, enables him to make judgments on forward speed, roll, yaw, pitch, altitude and side movements.

Further sophistication to the vertical display not only provides "real world" information but incorporates command or director information so that the pilot not only knows what his aircraft is doing in flight, but what it should be doing and how well he is performing his many tasks in the aircraft.

The progression toward automation has made human factors more, rather than less, important. Much more attention is being given to determining exactly where man fits into these complex systems; moreover, this attention is being focused much earlier in the creative engineering act. Matching men to machines demands careful planning to assure that the system works, that it can be produced at reasonable cost, that it will keep working, will be easy to fix and will be safe.

The millennium is of course not here. We will not through a consideration of the "H" factor, get "perfect" solutions. But we will get closer, we will telescope the time that design by evolution requires, we will more effectively use our human resources and we will create designs which are safer and easier to operate. ●



Courtesy Flight Safety Foundation, Inc.

The Lady

Since today's our first wedding anniversary, I hope you'll pardon me for a few sentimental reminiscences.

I'm not the type that keeps old corsages pressed in books of poetry or collects match covers from every O-Club or jazz joint we ever went to; and before we were married, Jim always used to say it was a darned good thing because how could I be a Navy pilot's wife and hope to move around all that kind of baggage?

But I guess we all carry a few mementos from the days we were falling in love and saying "I do." Luckily, mine aren't the kind you can see, and that's better because those last forever, and old flowers have a way of crumbling into a handful of dust.

I'll never forget the night I met Jim, for instance. It was at a middie ball in August in Norfolk, Virginia, the summer between Jim's second class and first class year at the Naval Academy. I really didn't want to go to the dance; but all my girl friends were going and I didn't have anything better to do that night since Dick Jennings, my heart throb of the moment, was at Nags Head with his folks for the week.

Rockwell Hall had been decorated with dozens and dozens of trellises all covered with artificial roses and ivy vines, and the ceiling was draped with white parachutes. The music was dreamy and I had on the new short white formal I'd gotten for the high school senior prom a few months before, and the moon over Hampton Roads was something to see that night.

There seemed to be thousands of fellows in white dress middie uniforms, all of them looking vaguely alike with their crew cuts and their sunburned faces. Then all of a sudden, Ginnie Wyatt, my best friend and I were being introduced to two of them, and when I took a good look at Midshipman James O'Hara, it was a shock I felt clear down to the toes of my pink kid sandals.

He had brown eyes that crinkled like he knew a secret joke he'd tell me sometime, and eyebrows—well, everybody's got eyebrows, but his were sort of wired for action. I mean they moved up and down when he talked, or when he grinned like he had a tiger by the tail—or maybe like he was a tiger with the world by the tail, I don't know. Anyway, the total effect was like a jolt of electricity—a couple of thousand volts!

The band was playing something sweet and sentimental, and the first thing he said was "I like Dixieland myself."

I thought Dixieland was Ole Virginie, the state where I was born, but right that minute I'd have agreed with anything that guy said, so I just whispered, "Oh, golly, me too," or something like that and floated right into his arms.

It sounds silly, I guess, but from that minute on,

and the TIGER

by Joanne B. Young

I was gone! Really gone!

He was in town for a few more weeks, and I get dizzy just remembering them. We rode the roller coaster at Ocean View, and sometimes just for the heck of it he'd undo the the safety bar and just hold me in while I screamed and yelled like crazy. He had the use of a little black MG convertible that summer with red leather upholstery, and he'd come tearing around the corner and stop at our house like he couldn't stand not seeing me for even the two more minutes it would have taken to drive there like anybody else, and I'd be out the door before he had the motor turned off.

It made my dad pretty sore, as a matter of fact, because the neighbors complained about how fast he took that corner, but I'd kid him out of it.

"Gosh, Dad," I'd say, "don't you remember when you were his age? You can't expect a future jet pilot to drive like an old fuddy duddy! Any man who's going to fly thru the sound barrier has to use a little speed. Besides, Jim's the best driver in the world!"

"He may be the best driver in the world," Dad would grumble, "but only a damn fool would come around that corner on two wheels when there are little kids in this block that don't know a street from a sidewalk. You tell that young man to slow down!"

"Okay," I'd grin, sitting down in his lap and tickling the bald spot on top of his head. "But let's face it, Dad—it's love!" By this time I knew it was love myself, and Jim knew it, and Dad knew it really.

He'd give me a big hug and only pretend he was still mad. "All right, baby" he'd say. "But tell that wild jet jockey of yours that I love your little brothers, too, so he can't break the sound barrier around here!"

I might as well have tried to slow down a hurricane as Jim in those days. He drove like one, ate like one, made love like one. But that's what would make him the best darned jet pilot in Uncle Sam's Navy. He told me so himself, and I knew it was true. When he slept, I'll never know; but he didn't seem to need sleep. He was a human dynamo that ran on a mixture of energy and ambition and love and just being 21, I guess—but it added up to atomic power!

The next year didn't go so fast. In fact, it was the slowest year of my entire life—just big black gaps while Jim studied so hard he didn't write very often and couldn't get weekend liberty and I'd just die a slow miserable death. He'd rather phone than write any day, though. I hate to think how much his phone bills ran up his first class year. Mine were bad enough, and Dad made me pay for half of them out of my own money once I started working as secretary for Overstreet and Smith, Attorneys at Law. Somehow the year was finally over, though,

and then there was June Week and graduation with President Kennedy himself the main speaker.

That next year dragged along too, until it seemed like all my life I'd been just waiting for something, but we decided to put off getting married 'til he'd finished flight training. That meant more months of phone calls and frantic, fantastically happy weekends. He got more time off now that he was an ensign, but it never seemed like enough. Then at last, at last, he got those gold wings, and best of all a year ago today, there I was walking out with Jim from the Pensacola chapel under that arch of swords and being so absolutely, unutterably bursting with happiness I felt jet-powered myself.

We had two weeks leave, and since Jim had orders to a squadron right there at Pensacola, we stayed in Florida for our honeymoon.

Honeymoon—there's a wonderful word. They say the honey is for the sweetness and the moon is for the madness, and I guess that's just about it.

I never knew life could be so wonderful! Sky never looked so blue before and stars just never were that bright. But—oh, well, you know what I mean. It was just heaven!

We lay underneath a big palm tree out on the sand for hours, and it was the first time we'd ever slowed down that much. Sometimes we just held hands and looked at the water until that old electricity ran from his fingers to mine so fast we had to do something, and then we'd jump up and race out to the float through those big blue and white waves and lie there panting to catch our breath. Jim always won—naturally!

Sometimes we'd talk about how it would be when we got older and Jim had command of the latest atomic carrier, and I was a captain's wife. Or sometimes he'd say maybe by that time jet flying would be too tame for him, and he'd be in the astronaut program, blasting off for Venus or Mars or someplace like that. You know—silly stuff and yet we meant a lot of it too.

Sometimes I couldn't help acting like a woman just a little bit. I'd say, "But you'll be careful, won't you, Jim? You won't take any chances you don't have to?"

Those eyebrows of his would go up and down like a semaphore. "Me not take chances, baby? Who do you think you married, a hardware salesman like your old man? When I quit taking chances I'll be out of this man's Navy!"

"I don't mean you should be an old fogey, Jim. After all, I married you because I love you the way you are—but you know, crazy stuff."

He'd just roll over and ruffle my hair and kiss my shoulder and say, "Now don't be a worry wart. No pilot's wife can be a scaredy cat; and baby, are you ever a pilot's wife!" Then he'd kiss my ear and I'd be utterly undone, and before I knew it, I couldn't even remember what I'd been worrying about.

Our apartment wasn't ready yet in Pensacola, so we decided that I'd stay on at the motel, which was about twenty miles down the beach from the base, and he'd go in and report for duty and then drive back each night for the next two weeks until we could move in.

The morning our leave was up I walked out to the car with him. "Kiss me goodbye, Mrs. James Michael O'Hara," he grinned. "You are now seeing your husband off to work for the first time. And by the way, slip out on the balcony in about two hours and if I can get a plane, I'll fly by and waggle my wings at you."

"Roger, Ensign O'Hara," I grinned, "but how'll I know it's not some other flyboy flirting with me?"

"You'll know," he said, "because I'm the best damned flyboy in the Navy!"

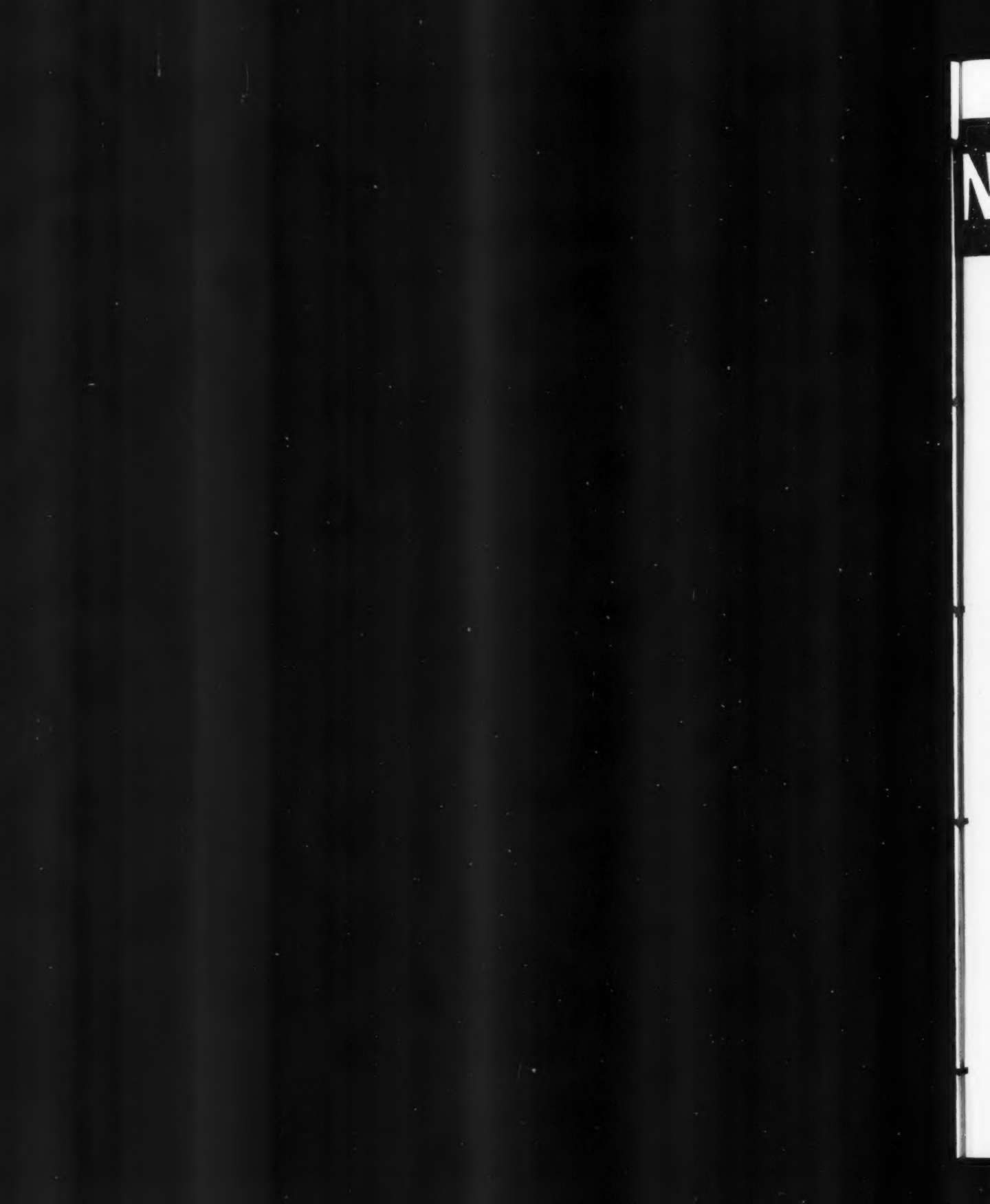
Then he kissed me and it was a kiss to remember for a lifetime. Dreamily, I went back to our room to wait.

I heard the jet coming, and I stood out on our balcony and waved my red beach towel. Maybe he turned to look at that, I don't know. I'll never know. He waggled his wings, and I saw the kids and the old folks on the beach flatten out on the sand and I laughed for a second—they were like my dad, always scared something would go wrong. Then he banked like crazy—he must have been doing the maximum that plane would fly. When his left wing dipped into the water and then sliced through that swimming float where we used to lie, my whole life blew up in a fountain of water and exploding metal and screams that were wrenched out of me as though I were crashing too. . . .

It's been 49 weeks now, 6 days, and 13 hours, but I can see it as though it were yesterday, and I always will. I keep thinking, "Maybe he *would* have been the best damned jet pilot in the Navy, but how will they ever know?" ●

About the Author:

Joanne B. Young, a pilot's wife, based this story on the experiences of several friends who were military pilot's wives. Mrs. Young writes for "The American Home" magazine, "Better Homes and Gardens" and others.



NIGHT HELICOPTER RESCUE

NIGHT HELICOPTER RESCUE

With the HSS-2 in fleet service and the HU2K-1 scheduled for service in the near future, night helicopter rescue of pilots in the water will soon be commonplace. A problem assignment has been given to VX-1 at Key West to come up with some answers on HSS-2 night rescue. HU-1 at Ream Field has been given a similar assignment for the HU2K-1 when fleet delivery commences.

In what is believed to be the first night helicopter recovery from a ship, on 23 June 1962 LT Paul Frankenberger of Helicopter Anti-Submarine Squadron 3, his copilot, ENS James R. Walker and crew rescued an AD-5W pilot who had ditched just after takeoff from the USS INTREPID. The INTREPID was the first carrier to take an HSS-2 squadron to sea and is the ship from which HS-3 flew to recover Astronaut Scott Carpenter.

Here are excerpts from LT Frankenberger's helicopter rescue report:

"At 2110 23 June, I was the pilot of AU-56. We were moving into position for a new series of dips in a screening compet when our controller informed us that there was an aircraft in the water on the starboard side of the carrier. We turned immediately into the ship and increased our speed to 140 knots (indicated). We crossed the bow from the starboard side to the port side and proceeded down the port side, slowing as we went. There were numerous flares and taxi director wands in the water and we moved into their general area. We had our flood hover and controllable landing lights illuminated. Our heading was 300 degrees magnetic.

"The winds were light and variable so I decided not to bother to turn into the wind. As we approached I saw a tracer go off, presumably from the pilot's .38 pistol. We continued in the same general direction. I first saw a green taxi wand in the water and then about 50 feet after that I spotted the pilot. He was floating on his back with his life vest inflated and his hard hat on. He was conscious—I could see his face plainly. The controllable spotlight aided greatly in 1) finding him and 2) determining his condition.

"I then moved the aircraft into position by manual hover, but as there were no good reference points by which to hover (all the flares and smoke lights were behind me now), I maintained altitude, 40 feet, and manually drifted the aircraft back until I could see the pilot just off my starboard nose. I then engaged the coupler (automatic hover) and drifted the aircraft ahead until my sonar operator told me that the pilot was directly beneath the rescue hatch. The pilot got into the sling and was hoisted aboard.

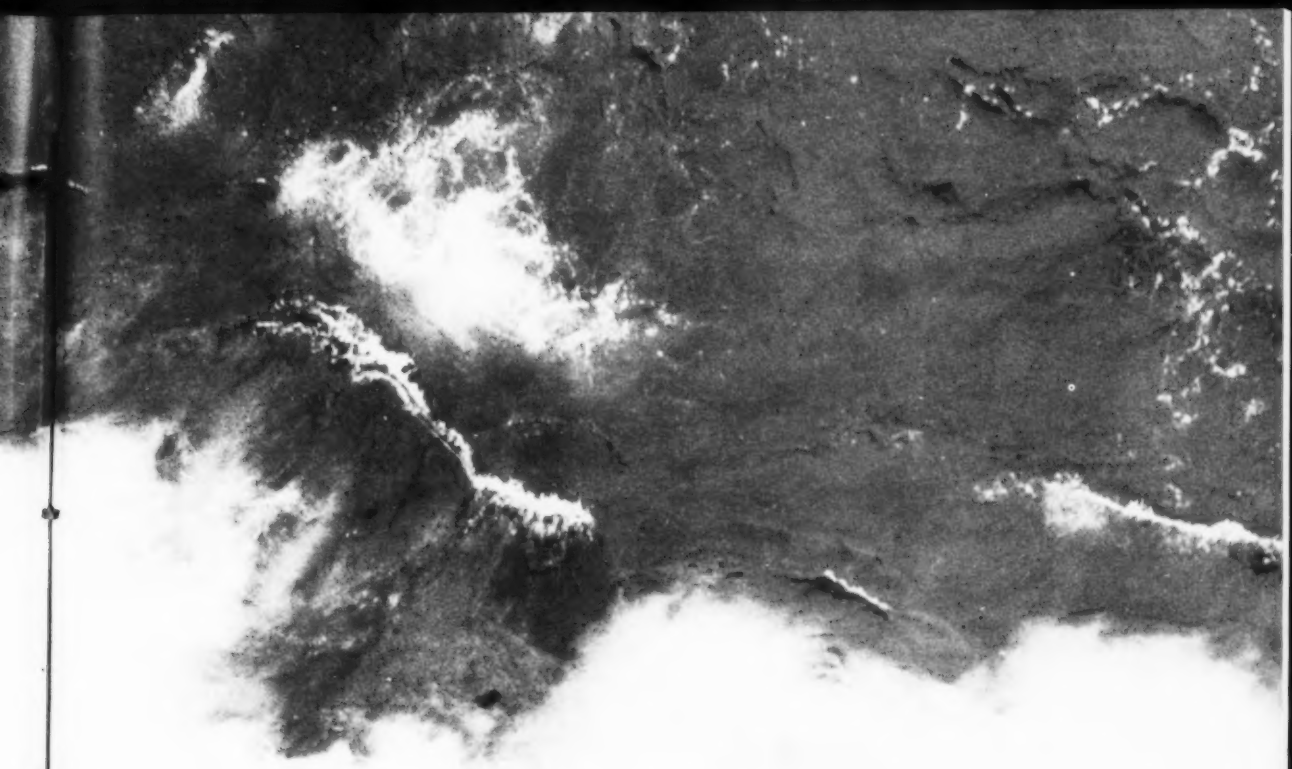
"As soon as the pilot was in the aircraft we headed back to the ship which was about ½ to ¾ of a mile ahead. I landed aboard the ship and discharged the pilot, then took off again and resumed my mission. I was back on station at approximately 2140. This was the first night helo rescue I have made. I feel that there are no large obstacles in the way which would prevent a night rescue operation from becoming as routine as a day rescue operation."

The LT had some comments to make on rescue technique:

"I would recommend that the helicopter be brought down to 40 feet manually and then be switched to the coupler (automatic hover). This would preclude overshooting the rescue somewhat. Then I believe that the pilot, with directions from the sonar operator at the cargo hatch, should use his drift and speed pots to move the aircraft over the rescuee. The flood hover lights, while not totally ineffective, did not give enough forward light to enable us to look for the pilot properly. The controllable landing light did and was therefore used. The flood hover lights aided the sonar operator greatly in his work.

"Also, while I fully understand everyone's desire to help the pilot I feel that there were too many various and sundry lights in the water and this only added to the confusion of attempting to find the pilot. As it turned out, the green taxi wand and the pilot's tracers were the best means I had of locating him." ●

Off the Port Bow...



On a second waveoff for being low on final, an AD-5W flew into the water off the carrier's port bow hitting tail-first. The initial impact was followed by a heavier impact and the aircraft mushed to a stop. Spotlights illuminated the sinking plane as the three crewmembers escaped. They were picked up in a short time by plane guard destroyer.

Well-briefed ditching procedure paid off in this accident, the AAR states. For continued reader familiarization with survival situations, here are excerpts from the narratives of the radar technician, and copilot and the pilot:

Pilot: ". . . I reached up, opened my canopy and released my lap belt. After debating a second or two, I left my parachute on and climbed out onto the port wing. I started back to the rear canopy but it opened just then and the radarman stepped out. The copilot came around the front of the aircraft and yelled for us all to stick together. I looked for the carrier then. It first appeared to be heading directly for us but eventually passed about 300 yards to starboard. The aircraft floated for possibly three minutes and during that time we moved several yards away from it mostly because of the carrier wake pushing us. I was having trouble staying afloat but after taking my gloves off I was able to unhook my parachute and inflate my life vest.

"In the meantime the radarman had ignited his night signal flare and shortly afterwards we saw a destroyer approaching and sweeping us with searchlights. We attempted to light our other signal flares but we couldn't get the night end tops off. We began blowing our whistles and yelling but were still not sure if they saw or heard us, even though they were sweeping our position with searchlights.

"When the destroyer approached close enough, we heard men on the fantail yelling for us to swim to the net they had over the side. There was also a net forward and men there yelling to us. We swam for the forward net since we were afraid of the screws aft. Someone forward threw us a float with a line attached and we all grabbed hold, letting them tow us toward the net. They threw the radarman a rope sling and pulled him aboard. The copilot and I reached up and took hold of the bottom of the net, but we were too tired to climb up right then. The men above then tossed each of us a rope sling and pulled us aboard. We had been in the water 12 minutes. . . ."

Radarman: "After the crash I moved my hand from the instrument panel and reached for the rear canopy jettison handle. I tried twice and couldn't find it. The water was beginning to come up my legs. I used my right hand to release my harness. For an instant the lights came on. I then used my penlight (which I keep near my knee board) to find the canopy jettison handle and blew it.

The rear scope was too close and I banged my knees on it when I left the aircraft.

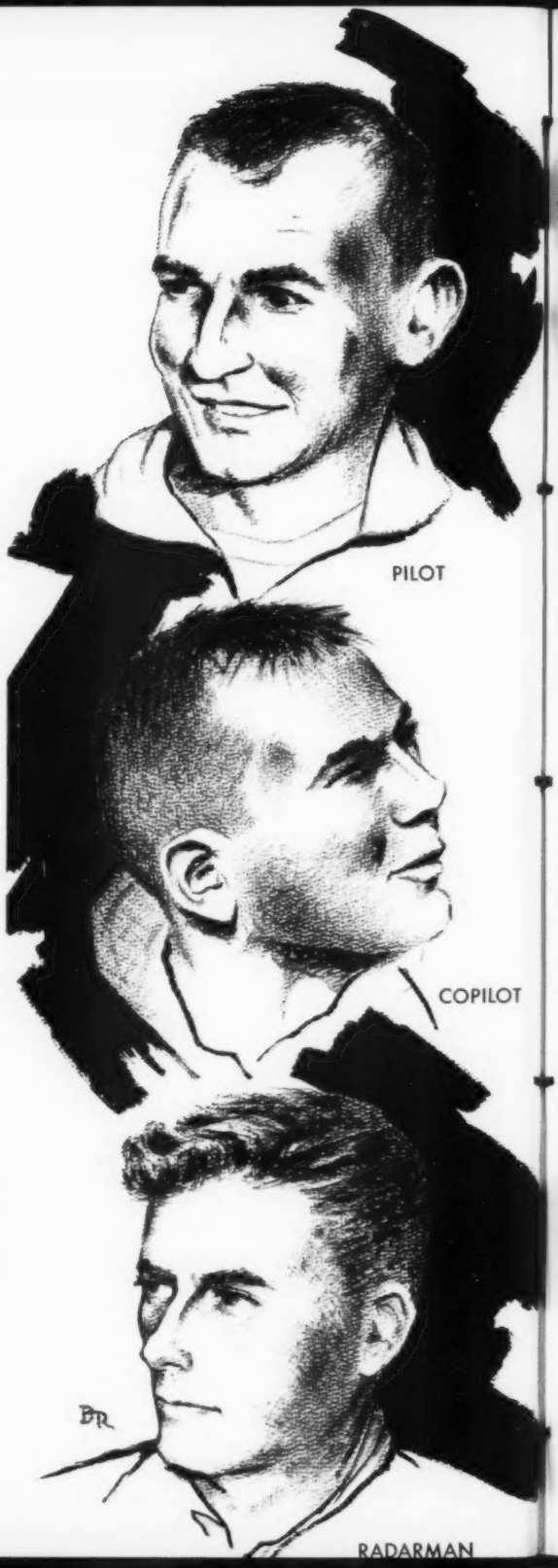
"I swam clear and disengaged the top strap of my parachute. The bottom straps were loose and when I kicked my shoulders out, the chute slid down to my ankles and got hung up on my shoes and knee board. After several attempts to free my life raft, I abandoned my chute and harness and swam to join the other two. I had trouble swimming with my gloves on and lost my left one. I joined the rest of the crew and inflated my life vest. We all removed our helmets.

"I lit a flare. With a glove on I couldn't distinguish the day from the night end and lit the day end by mistake. I doused it and lit the night end. When the pilot tried to light one of his flares the ring separated. The copilot tried to fire his .38 cal. pistol, but it jammed and failed to go off. All the time we were blowing our whistles.

"The destroyer then came into our immediate area. They had a net down on the after part of the ship, but we didn't want to get chewed up by the screws. We were afraid they hadn't seen us but we received an acknowledgement from them that they had. Finally, they threw us a line and pulled us close amidships where a net had been dropped. A sling was lowered and I was hauled aboard."

Copilot: "Although the initial impact was substantial, I thought we had a terrific knuckle of turbulence. However, the greater severity of the second shock and water in the cockpit when we finally stopped proved I was wrong. The IP-203 radar indicator had fallen loose and was resting across my thighs thus making the lap belt release inaccessible. I experienced only a little difficulty in lifting this 85-pound scope with one arm and releasing the buckle with the other hand.

"With the water rising, I rejected the idea of removing my parachute and I don't remember disconnecting my communications wires. I vainly tried to stand erect but realized I was hung up. Another futile effort and I noted my canopy was still closed. Although all the cockpit lights were



OFF, I found the canopy actuator knob and moved it to the full open position. My hurried efforts to leave the aircraft produced only what seemed like slow motion but I was next standing waist deep in water on the starboard wing. The carrier was now abeam. I waved toward the spotlights and was answered by loud cheering. I knew we had been sighted.

"Lunging forward, I pulled the CO_2 levers to inflate my life vest but only one of the cartridges fired. I removed my parachute and briefly pondered releasing the pararaft but, concluding that rescue would come soon, I abandoned the chute entirely. I discovered that although only one of the CO_2 cylinders in my life vest had been discharged, the resultant buoyancy was enough to sustain flotation and I made no effort to inflate it further. (Later, it was found that the CO_2 cylinder container cap had not been screwed down tightly. This allowed the CO_2 cylinder to move in the container so that the bayonet could not puncture the cylinder seal.)

"Looking around I saw two heads bobbing in the water and, finding no one was injured, I suggested we gather into a group. By now the aircraft had disappeared and about three minutes had passed since the ditching. The after plane guard destroyer was moving toward us.

"Although the sea state was slight, I thought my hardhat cumbersome and removed it. The others did the same which may have represented poor judgment since our helmets are striped with reflective tape which could have aided in our detection. We then turned to the task of making our whereabouts known. Each of us tried to fire a night flare but only one of them ignited. I loaded my .38 tracer revolver and attempted to fire but the gun was jammed.

"I next suggested blowing our whistles and by now the water around us was flooded with searchlight beams from the destroyer's decks. I released my shark chaser for good measure. As the destroyer closed our position, we could not be definitely sure we had been sighted and commenced thrashing wildly about and shouting. A cargo net was lowered aft and while the ship was still maneuvering into position we were told to 'Swim over here.' We declined, requesting a net forward. One was placed amidships and a float-line was thrown toward us. We were pulled into the netting and, while we held on, they lowered a rope sling and hauled us aboard one at a time."

Several items in the survival aspect of this accident require mention, the AAR states.

"While the actual process of ditching and evacuating the aircraft came off with little difficulty, the rear seat crewmember had a few moments of panic in accomplishing this. This was due to difficulty in locating the canopy jettison handle caused by the fact that it was pitch black in the aircraft.

"The state of preparedness on the part of the aircrew in the evacuation of the aircraft was commendable but several errors in survival procedures and judgment are evident. The fact that all three crewmembers abandoned their life rafts even though rescue seemed to be at hand did not indicate good procedure. The copilot's life vest was inflated after the rescue by the CO_2 cartridge that had failed to pop while he was in the water.

"Among the recommendations of this board are:

- That all pilots of this detachment be instructed again in the importance of immediately shifting attention from contact flying to instrument flying on a night waveoff or bolter and that instrument flying requires cross-checking of all flight instruments.
- That a strip of fluorescent tape be placed on the rear canopy jettison handle of all AD5 aircraft to assist in locating the handle in the darkness.
- That the training program of this detachment include lectures on the proper procedures in survival in the water."

Shipboard personnel involved in rescue efforts are encouraged to utilize a PA system to acknowledge sighting of survivors. Frequently, reports indicate anxiety on the part of downed airmen, thrashing about and eventual physical exhaustion —when all the time they have been in sight.—ED.

notes from your flight surgeon

HERE'S HOW TO FIGHT FATIGUE..

'Beat' or 'bushed' are just two of the common expressions used to describe a problem we all have at one time or another—severe fatigue.

Though all of us experience fatigue—sometimes more frequently than is necessary—few people are fully aware of what causes fatigue and what may be done to avoid it.

Did you know, for example, that noise can make you tired? It's a fact. In an experiment described in a recent issue of the American Journal of Psychology, it was found that even a great deal of noise, over a 19-minute period, failed to reduce the ability to work well by any substantial amount. But the expenditure of energy under these circumstances increased 60 percent.

Poor lighting may also tucker you out, and many people are surprised to learn, lighting experts say, that too much light may be more tiring than too little.

One of the most common causes of fatigue is also one of the most incredible: failure to breathe enough!

Sound fantastic? It isn't. Slouching in your chair, for example, rather than sitting erect, crowds your lungs; normal air intake is restricted. If you sit in a stuffy room, even deep breaths may not give you as much oxygen as you'd get from normal breaths in a well-ventilated room.

Quick-Energy Foods. The starches and sugars—known as carbohydrates—you eat are primarily responsible for providing you with energy. Dr. I. M. Rabinowitch of Montreal General Hos-

pital found that sugars appear in the blood stream in as little as two minutes after they are eaten. In this short period of time, there is a clear rise in the blood sugar level—a condition widely associated with freedom from fatigue. Try a midafternoon sweet for a pickup.

Vitamins. Though vitamins provide no energy by themselves, they are the agents that control the complex chemical reactions by which the body converts foods to energy, muscle, bone and tissue. You don't need a massive amount of vitamins. You do need the proper vitamins in the proper proportions. Thus, the weight of one particular vitamin tablet which contains only one calorie, is only 2 hundredths of an ounce. Yet, the amount of vitamins is approximately equal to the vitamin content of all the foods contained in a balanced diet of 3000 calories.

Weight. The more you weigh, the more energy it takes just to move around.

Sleep. You can probably sleep better on fitted sheets than on regular ones, better on cotton than on nylon. Ideal sleeping temperature has been estimated (but not conclusively proved) to be about 55°. If you find it hard to sleep, don't worry; relaxing completely with your eyes closed provides about 80 percent as much rest as you'd get if you were actually sleeping.

Fatigue, far from being an inconvenience, may be a valuable guide to your health. If you are in normal health, you should be able to work a full day—doing the same jobs others in your age bracket do—without any extraordinary fatigue. But if your diet, weight, sleep and stimulation are normal—and if you still feel more fatigued than others—the time is ripe for a visit to the flight surgeon.—*"Grumman Plane News"*

Flight Deck Accident

THE carrier had just turned into the wind in a light rain. The launch cancelled, an FJ-4B was being taxied forward from the port catapult. The plane captain, carrying the tie down chains in a bag over his shoulder, was walking behind and outboard of the starboard horizontal stabilizer with his head down to keep the rain out of his face. The taxi director gave the pilot left brake in order to park the aircraft diagonally. When the aircraft turned inboard, the tail passed in front of the plane captain blowing him feet-first over the deck edge and onto a gun sponson 10 to 15 feet below. He suffered a broken leg and possible internal injuries.

On the flight deck, as anywhere in the vicinity of aircraft, it's "heads up"—not *down.*

Keep It On

ON making an intentional wheels-up landing in an A4D on a foamed runway, the pilot, fearing fire, shut off his oxygen supply and loosened his mask.

In the event of fire, inhalation of carbon monoxide, flames and hot smoke can be as fatal as burns. A secure mask protects your face and your oxygen supply can save your life.

Helo Ditching

WHEN an HUS-1 crashed alongside a carrier, the pilot exited through the right open cockpit window without difficulty. He had trouble locating the toggles on his life vest because the straps were loose and the front of the vest floated away from his grasp. When finally he inflated the vest, it floated at a right angle to his body. In spite of holding it down with his arms to keep his head above water, he swallowed water and gasoline.

On the positive side, the pilot reported that his SPH-1 hard hat protected him from head injury when his head struck the top of the rotor brake handle and the top of the window track several times following the impact. He was of the opinion that if his shoulder harness had been tight the amount of buffeting would have been reduced.

All three members of the crew were rescued "essentially uninjured."

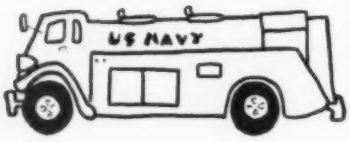
Spoiled Lunches

"INADEQUATE icing or refrigeration on the aircraft might have been the cause for the spoiled frozen lunches." Frequently, this office receives reports of this type, and usually they come in at such a late date that it is impossible to do an adequate survey and find the cause.

It is recommended that all aircraft commanders, upon finding that any type of inflight meal is spoiled, immediately report by radio if large numbers of people are involved, or at the next landing base. The base can then radio or communicate the message back to the base where the inflight lunches originated. Necessary investigation can then be undertaken.—*Flight Surgeon Report, "Mats Flyer."*

Wear Flight Boots

IF shoes are lost during ejection it is expected that the feet will be injured when a hard surface landing is made. In cold climates without boots, frostbite would almost certainly occur. Travel in a barefoot condition would be impossible in almost any terrain.—*Flight Surgeon in MOR*



SAFE HANDLING

34

FUEL FACTS

JP-5 is the Navy's primary jet aircraft fuel. Due to its high flash point, this fuel is relatively safe for stowage in unprotected tanks and is utilized on board aircraft carriers and other ships. JP-5 is also issued at certain Naval Air Stations in order to eliminate retrimming of aircraft engine fuel controls when shifting carrier aircraft operations from ship to shore. It is planned that utilization of JP-5 at air stations will be increased in the future.

Characteristics of JP-5. JP-5 is a special high-flash kerosene having a consistency virtually identical to the ordinary commercial product. The color may range from clear white to light straw depending on the crude source. The properties of JP-5 as compared with previous jet aircraft fuels are:

a. Higher flash point.
b. Lower volatility.
c. Higher heat content on a per-gallon basis.
d. Higher freezing point.
e. Higher viscosity.
f. Contains no tetraethyl lead.

Advantages and Disadvantages of JP-5. The property differences noted result in the following advantages and disadvantages for JP-5 with respect to other jet fuels.

Advantages of JP-5

+Less fire and explosion hazard in both ships and aircraft.

G OF JP FUELS

+ More storage capacity available in ships since protective storage is not required.

+ Elimination of evaporation loss during rapid climbs to high altitude.

+ Reduced tendency to vapor lock, pump cavitation and wear.

+ Suitable for use in higher speed aircraft subject to increased aero-dynamic heating.

+ Usable in ships, boiler and auxiliaries in an emergency.

+ Usable as diesel fuel.

Disadvantages of JP-5

— Starting problems on aircraft may be encountered on the ground commencing at temperatures below 10°F. Current engine specifications require engine light-off and acceleration to idle speed down to —30°F.

— The freezing point of JP-5 fuel, though adequate for all normal shipboard operations, will be marginal for special polar missions.

— Quality control problems are increased because both water and dirt are more difficult to remove.

— Availability is more limited though sufficient for naval carrier requirements. No significant change in thrust or other engine performance has been noted. Generally engines should be retrimmed when switching between JP-4 and JP-5.

Inflammability Explosion and Health Hazards of JP-5 Fuel. JP-5 was designed to make shipboard storage and handling of aircraft fuel as safe as possible. This does not mean, of course, that it will not ignite under any conditions. However, JP-5 is the safest aircraft fuel now in use and can be handled with very little danger of fire or explosion if a few basic precautions are observed.

Inflammability of Vapors.

All petroleum fuels, in order to burn, must be vaporized and mixed with air in controlled proportions. AvGas has a very strong tendency to vaporize and as a result, will always have considerable vapors mixed with the air over the surface of the liquid. In fact, in a closed tank, so much fuel vapor will be given off by AvGas that the fuel air mixture may be too rich in fuel to burn. When fuel is in contact with air, the fuel will continue to evaporate until the air is saturated. The variation of the saturation value with temperature is shown for three aircraft fuels in Figure 1.

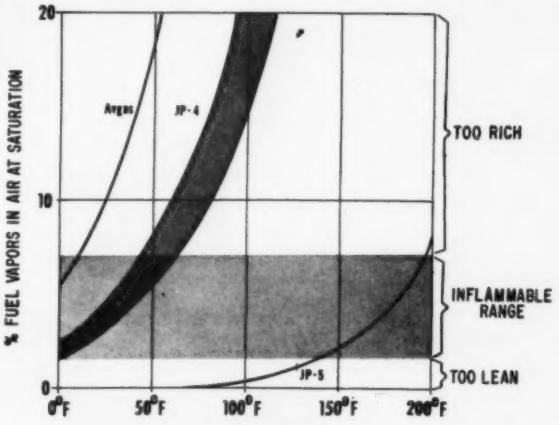


FIGURE 1
VAPORIZATION OF JET FUEL
ATMOSPHERIC PRESSURE

The amount of fuel vapor in the air above a fuel can never be greater than the saturation value. Of course, it takes time to saturate the air with fuel vapor, so the actual percent of fuel vapor may be considerably below the saturation point—especially if the fuel container is open to air circulation.

Only fuel-air mixtures within the inflammable range shown on Figure 1 will burn. The inflammable range for all present aircraft fuels is approximately 1-½ to 7 per cent. It is obvious from Figure 1 that JP-5 fuel will not give off enough vapor to be explosive until it is heated considerably above 100°F; however, if the JP-5 fuel is contaminated with even a small amount of AvGas or JP-4 the amount of vapor given off will increase to the point where it will be in the inflammable range at a much lower temperature.

Inflammability by Wicking or Spraying.

Although JP-5 fuel does not give off enough vapor to burn at ordinary temperatures, it can be ignited by heating it above the flash point. The flash point is the temperature at which the fuel gives off just enough vapor so the air in contact with it will contain approximately 1-½ percent vapor. The minimum flash point of JP-5 is 140°F. This flash point was chosen, recognizing that battle damage could allow leakage of the fuel onto decks and bulkheads of ventilated spaces in the ship.

It is also possible to ignite JP-5 without heating the bulk of the fuel to 140°F. This can be done by wicking the fuel on an absorbent solid material which can be heated locally until the fuel ignites. The local hot spot on the wick will furnish sufficient vapor to sustain the flame. Clothing soaked with fuel is an excellent wick. A fine spray or foam of JP-5 fuel can also be ignited and will continue to burn since the spray droplets entering the flame zone will be heated until they are vaporized. The danger of generating an inflammable spray of JP-5 fuel by leakage in a piping system is dependent on the pressure of the system. The pressures used in fuel handling aboard ship will not ordinarily generate a fine spray when a leak develops.

Static Spark Ignition.

Although JP-5 fuel is relatively non-volatile, the toxicity of the vapors is sufficient to cause serious effects if the vapors are breathed in a confined space for any prolonged period. An air mask should be used when entering tanks or replacing filter units. Many people develop skin irritations from contact with petroleum products. It is advisable, therefore, to avoid skin contact with JP-5 fuel and to wash with soap and water if contact occurs.

Summary of Safety Precautions.

- Avoid fuel spills on clothing and remove clothiods.
- Avoid skin contact with JP-5, if possible, and remove with soap and water if contact occurs.
- Wipe all fuel spills immediately and dispose of wiping rags. Liquid JP-5 fuel is not inflammable, but a rag soaked in JP-5 is highly inflammable.
- Avoid fuel spills on clothing and remove clothing if spills occur. Have JP-5 soaked clothing washed or cleaned as soon as possible. Since JP-5 will not evaporate readily, *soaked clothing may be a fire hazard for a period of days.*

Handling Precautions.

The stringent storage requirements aboard ship make necessary the maintenance of the 140°F flash point minimum of JP-5. In order to maintain this flash point, no comingling or mixing with other more volatile fuels in storage is permissible.

SAFE HANDLING OF JP-4

ALL petroleum fuels are hazardous. They require careful handling and strict observance of safety rules to prevent explosions and fires. General petroleum safety precautions are contained in Handbook on Aircraft Refueling (NavAer 06-5-502) and Military Fuel Operations Handbook (Standardization H201-A). Grade JP-4, because of the range of its vapor pressure, requires additional precautions in handling. This fuel forms explosive vapors from minus 10° F to plus 80° F, which are normal storage and handling temperatures. This means that the space above the liquid almost always contains an explosive mixture. In one respect, JP-4 is no different from any other petroleum fuel—it still requires a source of ignition to cause it to burn or explode.

Precautions. To minimize the danger from accumulation of static electrical charges in JP-4 jet fuel, the following precautions or procedures should be followed.

a. Avoid surface agitation.

(1) Do not use "overshot" or "splash" filling.

(2) Fill at slow velocities while the fuel level is low. In cone roof or underground tanks, the inlet pipe line rate of flow should not exceed three feet per second until the level of fuel in the tank is six feet above the filling point.

b. Minimize the entrance of air into the fill lines.

c. Avoid or eliminate the pumping of mixtures of water and fuel.

(1) Eliminate water bottoms in tanks, before and after a transfer.

(2) Insure that tanks of vessels or mobile equipment delivering fuel have been stripped of water.

d. Where practical, avoid the storage of grade JP-4 in tanks constructed of concrete or other poor electrical conducting material.

e. Properly ground or bond electrically all tanks, lines and associated equipment.

f. Where available use floating roof tanks for JP-4 storage since such tanks eliminate vapor space and provide a ready path for dissipating a static charge.

g. Equip JP-4 storage tanks with pressure-vacuum type conservation vent valves capable of providing for displacement of vapors at maximum filling rates.

h. Insure that gauge hatches and manhole covers are kept closed during receipt.

i. Extend overhead fill line below liquid surface.

j. Do not gauge or sample JP-4 tanks during filling.

k. Keep personnel off tank tops during filling operations.

All personnel, military and civilian, concerned with fuel handling are required to read and comply with Instruction 10341.2 of 5 June 1962 and with the safety precautions contained in Handbook of Aircraft Refueling (NavAer 06-5-502) and Military Fuel Operations Handbook (Standardization H201A).

(Copies of NavAer 06-5-502 may be obtained by ordering on NavAer Form 140. Copies of H201A may be obtained by submitting a written justified request to the Bureau of Supplies and Accounts (Code E-2), Washington 25, D. C.)

The instruction further states that:

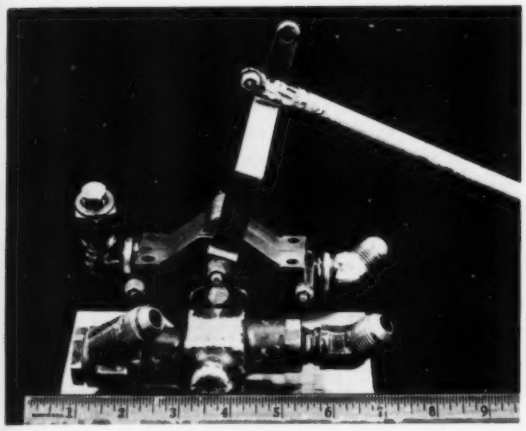
Fuel handling personnel shall receive thorough training prior to assignment.

Untrained personnel shall not be assigned to fuel handling details.

All containers of JP-4 fuel shall be clearly marked as to contents with painted letters or other practicable effective visual identification.—*BuWeps Int 10341.2 5/6/62* ●

Contributed by Jean O. Bushey, YN1

N



Stoof Goof

When a transient S2F-1 was preparing to leave an East Coast NAS the wings were spread. The right wing fell from the 90-degree position to the spread position in an uncontrolled fashion, hitting the stops quite hard. The aircraft was grounded for inspection.

Inspection of the wingfold area and mechanism revealed the forked end of the wingfold actuating mechanism rod assembly was found to be incorrectly installed on the timer check valve. The rod and bolt were in place and secured in the holes of the fork, without having been passed through the hole in the timer valve control arm. (See photo.)

It was determined the valve had been newly installed but had not been inspected by the installing activity. —*Contributed by CDR P. C. Morris*

R1820 Report

SUMMARIZING 1820 engine failure reports, BuWeps notes that piston, exhaust valves and springs and master rod bearing failures were the primary causes of engine removals. Impeller oil seal failure were also high. The average time on engines at removal was 673 hours.

To reduce failure rates, product improvement changes being incorporated at overhaul now or in the near future include:

R1820 E.B. 558: Established maximum service hours for pistons in all model R1820 engines at 3000 hours.

R1820 E.B. 571: Provides instructions for incorporating a new master rod bearing and knuckle in locking plate with improved spline characteristics to eliminate excessive spline wear at master rod bearing and locking plate locations.

*R1820 E.B. 573:*To provide a time coding procedure and establish a maximum service life of 2000 hours for all R1820 engine valves.

R1820 E.B. 575: Provides a new piston pin plug with increased durability.

R1820 E.B. 581: Reworks crankshaft to incorporate new sludge retaining plug which will reduce the possibility of sludge entering crank pin oil holes thereby increasing master rod durability.

R1820 E.B. 585: Provides a lip type copper back exhaust valve seat to preclude looseness and resultant compression loss.

R1820 E.B. 586: Provides improved oil control for extended operation time and increased durability by using chrome plated compression rings in groove No. 2 which will be identical to one used in groove No. 1.

R1820 E.B. 586: Increased rocker arm valve adjusting screw lock nut clearance on rocker box so adequate torque of lock nut during adjustment of valves can be applied.

In addition, a proposed oil pump change incorporating air bleed feature is being prototyped.

In the meantime, it is recommended that oil changes, strainer inspections and preoiling be in accordance with the latest instructions.

Insure strainer elements do not exhibit crushing and that assembly is made in accordance with those in the service instruction handbook.

Oil tank should be refilled following each flight since aeration problem may occur at one-half tank level.

The importance of proper positioning of and torquing of rocker arm adjusting screw lock-screw was also stressed—*BuWeps msg 251533/Z July 62*

Weigh Bill

THE TF-1Q was being positioned by two tractors on weighing jacks just inside the hangar. The hangar doors were open and the wind was a steady 18 knots on the aircraft tail. When about two thirds up the jack ramps the aircraft pivoted; left wheel forward, right wheel aft. This motion rotated the port wing tip into an A4D, damaging both aircraft.

Investigation revealed the following related facts:

a. The TF-1Q model has virtually all weight dis-

tribution on the main landing gear, and very little on the nose gear.

b. The conditions in the hangar were crowded.

c. The assistant to the towman was standing near the wheel with a chock but was unable to reset in time to help check the aircraft rotation.

This ground accident was caused by crowded conditions and wind. The nose-light condition, coupled with the tail wind facilitated and induced rotation of the TF-IQ.

The Weigh Master, as an expert in this field, erred by not ensuring ample room for spotting the aircraft and by not ordering the hangar doors closed before attempting to have aircraft positioned on jacks.

It is recommended that the Weigh Master ensure that the following conditions are met before weighing:

- Sufficient room so that no damage will result in event the aircraft slips off ramps or weighing jacks.
- Hangar doors are closed.
- That each main landing gear have a chockman available during aircraft positioning.

It is further recommended that when the above conditions are not met that the towman will not move the aircraft onto the weighing jacks.

This was a preventable accident. The common sense precautions of closing the hangar doors in the face of the 18-knot winds and providing safe working room would have averted or minimized the mishap.

The Weigh Master will ensure that sufficient room is available for weighing, that a chock man is stationed for each main gear, and the hangar doors are closed prior to positioning the aircraft on weighing jacks.

The aircraft towman will not position any aircraft on jacks unless the above conditions are met.

Ice and Snow Removal

REPORTS indicate some airplanes have come into the barn with severely mutilated upper wing surfaces—apparently caused by the flagrant wielding of sidewalk ice choppers, gardening hardware, broom handles, or improvised scrap iron implements.

It's a bit difficult to believe that such crude methods can be used in an environment of slick, precision equipment. Prime characteristics of aircraft are a combination of the lightest weight with the greatest strength and flawless streamlined surfaces. Metal surface strength requirements are precisely calculated to stand air and ground loads with a liberal margin of safety—but not a thousandth of an inch in thickness is added to accommodate abusive wear and tear.

Gouges, scratches, dents and other irregularities serve as concentration points for fatiguing stresses —in other words, cracks develop from these scars. When these surface mutilations are polished out the skin is thinned and no longer provides the initial strength. Tolerances for reduced thickness is almost nil. Beyond this tolerance the only recourse is to replace the material. Remember the skin is not merely a cover over an airplanes skeleton for streamlining. The surface is stressed and carries a very substantial portion of the air loads. When we beat and mutilate the outer skin we are whacking away at the basic integrity of the machine. For an airplane to be continuously airworthy and efficient, the outer surface must be the right thickness, free from any flaws and slick to allow frictionless airflow past it.

Let's learn to regard the outer surface of our aircraft not as a housing for a conglomeration of gadgetry, but as a major contributing feature of the machine. We could fly without an engine or two—without instruments, without hydraulics and minus a lot of other things, but it wouldn't be an airplane without its skin. It deserves the finest preservative treatment and respect because it probably does more work than any other single component of the airplane, even the engines which helps keep in their places.

To go back to the ice chopping—the book says to remove ice frozen to surface with approved deicing fluids—then, when solution has been on the surface long enough to melt or loosen the ice, remove the loosened ice and slush with cloths, soft bristle push brooms, or old fashioned straw brooms.

Removal of Foam

GOOD results have been experienced by Crash/Rescue personnel at McChord AFB, Wash., in using a helicopter to expedite the removal of fire-preventive foam from runways. The water tanker waters the runway so that the water flows under the foam blanket. The helicopter then approaches the runway at a 90-degree angle to it, and the rotor wash literally rolls the foam off to the side of the runway. As a result a strip of foam can be removed in approximately one-third the time required when two 0-11 A crash trucks wash the foam off the runway.

DIR Aid

THE Safety Center has noted a growing problem in regard to the Disassembly and Inspection Report (DIR). It should be noted that when the custodian of an aircraft reports a mishap (accident, incident, flight hazard, etc.) the need often arises for the custodian to request supplementary information in the form of a Disassembly and Inspection Report (DIR).

OpNav Form 3750-1 (Rev 12-59), The Aircraft Accident Report, page 2, Part II, item 3 and OpNav Form 3750-10 (Rev 7-60), Aircraft Incident, Flight Hazard, and Ground Accident Report, page 2, item 35, provide a space to indicate if a DIR has been requested. This does not indicate specifically which O&R or contractor will perform the DIR. It is necessary to know where the DIR will be performed for information in later analvsis.

This problem can be completely eliminated if all reporting custodians will refer to and follow the procedure outlined in OpNavInst 3750.6D, paragraph 37b, and BuAerInst 13070.1, Part II, Section I, paragraph 1.c.(3).

The Naval Aviation Safety Center should be an info addee on all message traffic relative to DIRs resulting from accident or incident type reports.

It should also be noted that it is the responsibility of the originating activity to monitor their request until the DIR is completed.

FOD

DAMAGE to a TJ2 jet engine occurred when two mechanics were turning up the engine. One of them stepped close enough to the intake for the suction to pull his trouser pocket inside out and allow three brass keys and three pennies to enter the engine. Damage to the engine was about $1000. Comments on the Form NavExos-108 stated "Personnel briefed on local Instruction 13720.1."

Investigation revealed that personnel were briefed on instruction *after* the accident.

A magnetic sweeper at this station is used to clean around the vicinity of aircraft, but will not pick up brass or copper objects. Nor can it clean the area where aircraft are parked. It was recommended that a vacuum cleaner, similar to the powerful ones used in filling stations, be obtained for use in cleaning out pad eye holes.—*CNABaTra* ●

F4H Murphy

FOLLOWING a post calendar check an F4H was test hopped. With stabilizer augmentor engaged, the aircraft became nearly uncontrollable in yaw and roll. Violent rolling tendencies were experienced at 230 knots. With stab aug disengaged control became normal.

Trouble shooting revealed:

1. Rudder response with stab aug engaged, ARI disengaged 5 degrees in improper direction.
2. Signal voltages to electrical connector or integrated rudder power control cylinder was proper.
3. Replacement of the control cylinder corrected the malfunction.

Cause of the malfunction was determined to be the electrical connections to the servo control valve of power control cylinder which were *reversed.*

It was recommended that all recently overhauled surface control cylinders be rechecked for proper functioning.

Changes in Test Flight Rules

HEADMOUSE

Dear Headmouse:

Existing instructions state a minimum crew, flight to be conducted in vicinity of home air field. Any discrepancies noted will be turned into maintenance for correction before aircraft is released for training flight or operational flight.

This P2V training squadron continues to fly tests in conjunction with training flights with 10 to 12 crewmembers aboard. A new yellow sheet is made out while airborne. This practice is not conducive to good maintenance or safety practices. We believe an article on Test Flights (how, what, when, where) should be published in APPROACH.

CPO

▶ APPROACH featured the subject in the July 1961 issue based on BuWeps Inst 3700.2 dated 20 July 1960. The subject has since been updated by BuWeps Inst 4700.2, The Naval Aircraft Maintenance Program, dated 6/21/62, Chapter 8. pp 8, 9. While the latter instruction embodies essentially the same information contained in the earlier instruction a change has been made in the area you mention. It states:

(1) that at the discretion of the CO, "test flights may be accomplished in combination with operational flights, provided the operational portion is not conducted until the test flight requirements have been satisfied and the results of the test entered on the test flight check list. The general purpose code assigned to a combination test/operational flight should be the one which most fully describes the purpose of the flight.

(2) "Pilots and crewmembers performing the test flight shall be given a thorough briefing by the maintenance officer or his designated representative (normally Quality Control). The briefing should describe the test requirements for the particular flight; the expected results; and when appropriate, corrective or emergency action to be taken if required.

(3) "The test flight shall be conducted with minimum crew necessary to ensure proper operation of all required equipment for operational readiness.

(4) "The test flight shall be of sufficient duration to adequately perform the prescribed tests and determine which items require additional maintenance work.

(5) "The test flight shall be conducted within the local areas and should normally be conducted under VFR conditions during daylight hours. The necessity for flights under other than VFR conditions should receive adequate considerations by the CO or O-in-C.

(6) "Test flight forms should be properly completed and, at the termination of the flight, returned to the maintenance department."

Very resp'y,

Headmouse

Recognizing Accident-Free

Dear Headmouse,

In "Little Man's Chances" (August APPROACH) you completely missed Anymouse's point. His "big" competition is undoubtedly a similar squadron, not a larger one. His questions are still valid. I must restrain my comment on the second paragraph of your reply but will admit that the reasoning behind the elimination of "Charlie" damage accidents in safety point scoring is unfortunately also valid.

All squadrons with good safety records, especially accident-free squadrons, should be recognized by Type Commander or CNO commendations even if they don't win the Safety Award.

ANYMOUSE

▶ Perhaps you meant BIG in the sense of "close." As to your second question, type commanders are supposed to issue letters to accident-free squadrons.

P.S. Would like to use some of your competitor's friends in the Bureau (if he really has them) to help call attention to certain items that need fixing.

Very resp'y,

Headmouse

R4D-8 Performance

Dear Headmouse. Request certain questions on the performance of the R4D-8 be clarified:

1. Our command is operating one R4D-8 from Peterson Field, field elevation 6170 feet. The chart on page A-14C of the Flight Manual (Revision 4) gives single-engine rate of climb for various parameters of elevation, temperature and humidity. The chart, however, provides a temperature curve only from 59 to 110°F. Is it possible to obtain accurate performance data at lower temperatures by extrapolating the curves? When the curves are extended to the winter temperatures in our area it appears that higher humidity provides a bonus in performance below about 40° F. If this is true could you explain the reasons for this bonus when high humidity penalizes the performance at higher temperatures?
2. Could you provide guidance on Navy directives or recommendations on the minimum single-engine rate of climb after takeoff and over relatively flat terrain? The example provided in Revision 4 to the Flight Manual selects 200 ft/min. Is it permissible to select a lower figure? Any references dealing with this subject would be appreciated.
3. Page 78 of the manual gives the times at which the fuel boost pumps are to be used. This does not indicate use of the boost pumps on landing. Please give the reasons for this and the Safety Center's recommendations on the use of boost pumps in the landing approach.
4. I have been told that certain Naval orders or recommendations have been

issued on the maximum allowable crosswind for operation of the R4D-8. None have been received by this command. Please send any information available on this subject.

LT. COL. F. C. THOMAS, USMC
COLORADO SPRINGS

▶ Humidity can only have a deleterious effect on brake horsepower (BHP) available as indicated by the graph on page 140 of the Flight Manual. No bonus will accrue due to humidity at the lower temperatures. Thus, the curves should not be extrapolated beyond the limits shown. These data are based on 1475 BHP available at sea level, standard conditions, and from this taking decrements for higher temperatures and humidities. As shown by the Engine Operating Limits Curve on page 100 of Flight Handbook, Navy Model R4D-8, -8Z Aircraft, No. AN 01-40 NK-1 of 1 Sep 1953 revised 1 Aug 1960 1475 BHP is the maximum which this engine can produce on a standard day at sea level. Extrapolation of the curves you mentioned would require more power or overboosting of the engine.

The example provided in reference you mentioned was only meant to be illustrative. The selection of 200 ft/min is not intended as a recommended limit. It is left to the discretion of the operating commands to determine whether a higher or lower rate of climb would be suitable for the surrounding terrain.

It is recommended that the fuel boost pumps be used as required by the Handbook and in addition, during landings.

Interim revision No. 6 dated 30 Nov 1961 states 'Landings and takeoffs under crosswind conditions resulting in a 90-degree crosswind component in excess of 15 knots is (are) not recommended.' "

Very resp'y

Headmouse

Bad Mix—Bad Fix

Dear Headmouse

It started off as a routine day VFR ASW hop. Our HSS-2 had been buzzing along in 4.0 fashion for almost 2.2 hours when I noticed a fluctuating torque indication on No. 2 engine. In a matter of seconds, the torque deteriorated to 10-30% (we had been flying with 50% on both engines) and it was obvious that we were soon to lose the services of No. 2 engine. I informed the CVS of our condition and position (12 miles out) and asked them to clear the angle deck.

My next act was to add emergency throttle to try to smooth out the fluctuation of torque. This was successful, but with 100% engine speed we were getting virtually no power to the transmission. This was accompanied by low fuel pressure and low exhaust temperatures.

We prepared for a single-engine run-on landing but at about 5 miles from the ship, the torque on No. 1 engine started fluctuating between 10% and 80%. The aircraft twisted violently about the vertical axis accompanying the momentary loss of power. The fluctuations in No. 1 became more frequent and at about 1 mile from the ship I informed the tower that we were losing No. 1 but would try to get it aboard. As the rotor did its last few twists, we eased her onto that good old flight deck. Before I could ease the collective to the bottom, the No. 1 engine was through. It didn't even have enough poop left to turn the rotor with bottom collective. How close can you get? The copilot and I just looked at each other and shook our heads.

Now, for some of the "why's" and "wherefores." Low point drain samples of fuel turned up about a half pint of non-JP5 in each quart. The other 3 HSSs airborne were recalled and all 13 checked for contamination. The score: 4 of 13 had bad fuel. Further investigation disclosed that the plane captain refused fuel from one JP-5 hose because it was cloudy. He informed the fueling PO of this condition and then went about finishing the preflight, since it was a turn-around aircraft for the next hop. The big question is: Was the refused hose used to fuel the aircraft when the plane captain turned his back?

As from all "close ones", lessons were learned. Plane captains, make sure the fuel going in your aircraft is the stuff you okayed. Aviation fuels officers, make sure the people fueling aircraft and sampling low point drains know what good and bad fuel looks like.

—Anymouse

▶ Horrors!—One of these at a time is enough—but, here's another report of an accident wherein refueling vehicle marked as containing ADI fluid actually contained fuel. The flight mechanic assigned to the aircraft realized the error and though his prompt action of diverting the nozzle of the fuel hose from the mouth of the ADI tank, prevented any fuel from entering the tank. Immediate action was taken there to prevent the unit from being used as an ADI hose from the mouth of the ADI truck. It was recommended that all activities review their servicing procedures to preclude this possibility.

For detailed info on JP-5 please see article, page 34.

Very resp'y,

Headmouse

Dual Investigations

Dear Headmouse,

I have seen statements by creditable witnesses expurgated from accident reports because they did not support the accident board's conclusions.

Would spot investigations by staff or Center officers reduce the possibility of such an arbitrary procedure?

ANYMOUSE

▶ The word has a way of getting around, even on the rare occasions such shenanigans are pulled. NASC investigates around 10 percent of the accidents, but only from a positive standpoint of hardware, equipment, trends, similarities between undetermined accidents, . . . Your question concerns disciplinary measures, which we try to keep totally separate from safety. Fleet and type commanders do sometimes order parallel investigations.

Very resp'y,

Headmouse

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

Letters

Tape for Safety

FPO San Francisco—Have you ever gone under an aircraft that has had a hydraulic failure or unsafe gear indication and try to safety the gear at night? I know that this is a regular Crash Crew job, but I think it is about time we tried to make the job a little easier.

The same situation in regards to safetying an ejection seat at night, or even in the daytime.

I think I have a very simple solution: Mark the holes and clamp spaces with International orange tape, reflector tape preferable. The cost is almost nil, but the end results would be the saving of a human life or damage to an aircraft.

While I am at it, one further item, couldn't the wheel pins and seat pins be stored in orange bags on the aircraft so it is much simpler for us to find them?

WILLIAM F. FESTINC, GYSGT E-7
MAG-11 Crash Crew

• Good ideas, Sergeant. Perhaps others will give them a go.

Underboost Underestimated

NAS Miramar—The pilots at this station, particularly those in a position of influence, are of the impression that underboost is (a) totally fictional and (b) applies only to the R3350 anyway.

Request that reprints of some of your past articles pertinent to underboost be sent to me at the address shown below. If this is not possible, request that you inform me of the issues in which I might find your original articles on underboost.

Yours for fewer engine changes:

AN AIRCRAFT MAINTENANCE OFFICER

• NASC records indicate your observations are correct. The underboost article "Keep the Pressure On," which first appeared in the April '59 issue of APPROACH has been reprinted in the R1820 Engine Summary distributed March '62. Copies are on the way. Additional copies may be had by just dropping us a card.

Ordnance Safety Posters

NAS Jax—Request information relative to obtaining Ordnance safety posters for display in the Ordnance Shops of aviation squadrons based at Cecil Field, Florida.

Posters should be pertinent to the following items

20MM Aircraft Machine Cannon.
Bombs, General Purpose, Handling and Loading.
Rockets, Conventional type, Safety in Handling and Loading.
Missiles, UNCLASSIFIED, Safety in Handling and Loading.
General Ordnance, Trucking, Palleting, Stowage, etc.

L. L. CLAY
NAESU Ord Tech

• It is regretted that the ordnance posters are not available from the Safety Center. We agree that a definite need exists in this area.

At the present time ordnance safety as such, does not fall within the area of our authority, however, we have hopes of being able to produce some posters in this field in the near future. If and when we are able to do this, the posters will be distributed with Crossfeed. Meanwhile, if readers have any other specific ideas for ordnance posters just drop us an informal memo.

O & R Talent Use

NAS Alameda—A course on "Aircraft Accident Investigation Procedures" for O & R Aircraft Engineers has been completed here. The sole purpose was to produce a man with some investigation background, who could intelligently assist an AAR Board. An engineer is already technically sophisticated so the course was only 10 hours long.

On completing this endeavor and evaluating results, I think most of them feel it was worthwhile. But some interesting side rewards are in evidence.

I gave the course direction but relied heavily on the broad experience of the engineers themselves to;

(1) cover their general experience in this business.

(2) tell the others how to protect interest (i.e., an airframes man wants certain things checked, photographed, and brought intact for DIR) and,

(3) what to look for from an individual specialist's viewpoint (i.e., power plants people like to start with fuel control and fuel contamination).

From this I was able to note certain recurring complaints. The main complaint centered on O&Rs not receiving a history, photos or complete (fully inventoried) part. Without these things the DIR is written in the dark, and the facilities, talents and experience of the engineers is not utilized. By history, I mean pilot's statement, witnesses' statements, pertinent recorded data, . . . By photos I mean the part (or parts as found, shot from all angles).

I realize a lot of AAR boards are fussy. "What do they need a history for? All I want is the answer on this fuel control." These engineers are dedicated, they're honest and they'll give a board the benefit of experience to a depth available nowhere else. They don't register this complaint on shortage of information because of curiosity, but out of a genuine desire to provide the best and most complete report on what happened or possibilities of what happened.

If all cases involving DIR were clearcut the reluctant attitude would be justifiable, but this is seldom true. Engineering personnel can suggest other possible courses of exploratory action and they can usually keep a board from arriving at preconceived ideas.

Okay, that's the pitch, now here's the fast breaking curve: I would like to see P3750.6D changed (Para 37.b.) to instruct the board to forward the above information with DIR part or parts.

W. A. ELLSWORTH, LCDR

• Your course seems to have considerable merit. Maximum advantage should be made of talents, experience and facilities available at an O & R. Accident prevention and increased material reliability are bound to result. Perhaps your efforts will stimulate interest in this area. NASC is now writing 3750. 6E. Your recommendation is being given due consideration.

Challenge Accepted

NAS Alameda—In reply to the challenge extended by LT D. J. Florko of VS-22 in evacuating an S2F through the side window of the cockpit we, of Patrol Squadron 19, submit the following:

1) On 6 April 1962 LT C. D. Hamilton PPC of VP-19's Crew One effected an escape from the fully strapped in hands on yoke position in a P2V-7 to

Cut . . .

Break . . .

Out in 36 Seconds.

the stand-up position on the test stand in just 36 seconds.

2) Admittedly the side window of the P2V-7 is slightly larger than an S2F; however, LT Hamilton, as shown in the second picture, later believed "it was unnecessary to inscribe the area to be knocked out." He further contends with more realistic motivative force (fire) he could, perhaps, accomplish the feat in 30 seconds!

JOHN TROTTER, LTJG
Patrol Squadron 19

P.S. The window was surveyed.

A3D 'Real Bear'

Sanford, Fla.—Thanks for the coverage of our A3D that experienced engine failure on a bolter in July '62 APPROACH. Due credit should be given to the pilot, LCDR D. C. Hamilton, who was ahead of the aircraft all the way. Those of us who have flown the A3D know well that it is a "real bear" single engine in the landing configuration, especially on a wave-off. LCDR Hamilton's situation was further complicated by the fact that another A3D was launched from the No. 1 catapult just as his engine failure occurred, which did not show in the photographs.

W. W POWELL, LT
ASO VAH-3

A Litter Bit

Key West—Personnel involved in flying the HSS during lunch-time often have taken their box lunches with them. After eating and not being able to throw away the box and its used contents, they put it under the seat cushion in which the PK2 life raft is enclosed. The can opener (church key) which is enclosed has in the past punctured the life raft with no one knowing about it until the rafts came into check. That could very well be *85 days* from the time it happened. So here is a piece of equipment that is useless.

Recommend: (a) that a litter bag be placed in the aircraft. Could be a small bag made of canvas tied under the sonor gear where the first operator sits.

(b) On preflight the plane captain check under the raft for FOD. If any sharp objects are found, the raft be removed for check and test.

R. T. SMITH, PRI

• Agree—litter should be put in a litter bag. Ed.

NAMTraGru Instructors Take Hint

Lemoore, Calif.—A three-line item in July APPROACH *planted a fruitful* seed in the minds of three NAMTG instructors. R. E. Grimes, AMEC, T. L. Waddell, AMHC, and C. E. Trundle, AMH1, with Det. 1015 (A4D), read the item suggesting a safety harness for use by plane captains manning aircraft on carrier flight decks. Since all of these instructors have had previous carrier experience, it struck a personal note.

Grimes, Waddell and Trundle thought the situation through, and collectively designed two separate personnel harnesses which would fulfill the needs as stated in the original article. The fabrication of these harnesses was considered to be entirely feasible, since they could be locally manufactured from existing stocks of material contained in parachute lofts.

The designs were submitted to the NAMTC Area Representative, who considered them to be outstanding and subsequently submitted the designs to the Naval Aviation Safety Center for consideration.

Actions of this type bear out the axiom that from small acorns, mighty oaks will grow and that from a small, apparently insignificant idea, a major contribution to the safety of aviation personnel can be affected.

The process, however, requires two major steps to attain fruition: First, the new idea must be conceived and brought to light. Second, personnel must have sufficient initiative to devote the time and thought necessary to make this idea into a reality. Thinking about a subject or talking about it can never be a substitute for action. When the safety of personnel is involved, or the safety of equipment can be effected—duplication of effort is certainly not a waste of time. The efforts of one individual may be the very key necessary to unlock the secret and provide safer or improved conditions for all aviation personnel.

S1O

• Good show! The designs were forwarded to BuWeps, and it looks as if there has been similar thinking on the matter. The following information was received from El Centro:

Prototype models of such an item have been evaluated aboard ship by VA-195 and found to be very satisfactory with only minor discrepancies, which have since been corrected.

The vest incorporates hardware compatible with integrated torso harness restraint systems. It is designed to be worn continually on the flight deck and to provide full retention during occupancy of the aircraft cockpit. Normal and emergency egress are identical to standard pilot procedures with the exception of ejection which is not compatible with the system. Open sea survival capabilities for plane captains wearing the vest and pilots wearing the MK-3C life preserver are identical.

The restraint/flotation vest is adaptable to single item stock procurement but not manufacture on the squadron level. Therefore, issuance of a proposed Aviation Clothing Survival Equipment Bulletin for manufacture of the item is not anticipated. This facility is currently procuring 20 prototype production items for extensive fleet evaluation. General procurement will follow thereafter as funds are made available.

Want Buddy Stores Info

Recently, the Center received a query from the skipper of an A4D squadron questioning the A4D Flight Manual recommendation that if the buddy store refueling hose cannot be retracted or jettisoned, then the buddy store should be jettisoned if the aircraft must be landed aboard ship.

In his Air Group there have been several inadvertent landings aboard ship with hose extended with no damage or injury resulting. Inquiries to other air groups indicate that this is not an unusual occurrence and has never resulted in injury or damage. In view of the high cost of the buddy store ($25,700), it would certainly be desirable to retain the store if it can be proven that it would be safe to do so.

Unfortunately, there is no record in the Center of any extended hose landing ever being made aboard a carrier and therefore, no statistical evidence to support a recommendation for change in SOP. The primary reason for present SOP seems to be that in the event of a bolter, the hose might flail and cause injury or damage on the flight deck. If any readers can, through squadron experience, shed additional light on this discussion, please drop us a line.

Remember—Report an incident, prevent an accident!

Murphy's Law Prevention

Van Nuys, Calif.—We have been privileged to read several issues of your splendid magazine and have been greatly impressed with your presentation of the "Murphy's Law" material.

Since our "Technical Data News Letter" reaches close to 6000 writers, editors and illustrators in contractors' plants who are responsible for the preparation of Navy instructional publications such as, Pilot's Manuals, Handbook of Maintenance Instructions, Parts Breakdowns, which become the official document for operating and maintenance personnel, we feel that if we could have permission to reproduce some of the "Murphy's Law" material, it may alert the compilers of the handbooks to possibilities brought out in your material. The more the compilers of handbook material become aware of the situations encountered by maintenance personnel, the more they can exercise care in the preparation of this important material.

Therefore, we request permission to reprint, with credit given, some of the "Murphy's Law" material.

BAGDEN ENTERPRISES

Seat System Training

Memphis—Naval Air Maintenance Training Group Detachments 1016 (A4-D) and 1014 (F4H) located at NAS Oceana have initiated a program which may well prove to be most helpful in aiding crashed pilots. These two detachments recently checked out the flight surgeon and various corpsmen of the NAS Oceana Marine Air Detachment Medical Unit in the ejection systems of the A4D and F4H.

Special emphasis was put on training in arming and dearming the seats. If the ambulance crews arrive at the scene of a crash before the crash crew does, this training will enable them to dearm the seat and to proceed with the rescue of an injured pilot. The time factor involved may well prove to be vital in saving the life of a pilot since the Medical Department personnel would not be forced to wait for the crash crew to dearm the seats.

The major safety factor involved in this operation is the fact that improperly trained personnel, in their anxiety to assist a pilot in the crashed aircraft, could possibly eject the injured pilot with drastic results, if these personnel have not been thoroughly indoctrinated in the safety precautions of these two ejection seat systems.

G. J. SCHNABL

Mark I Goody

Lakehurst, N. J.—Here are pictures and a sketch of a gadget we call the "FORK PLUG." This Mark I Goody has received some nice remarks from various A3D types regarding its usefullness.

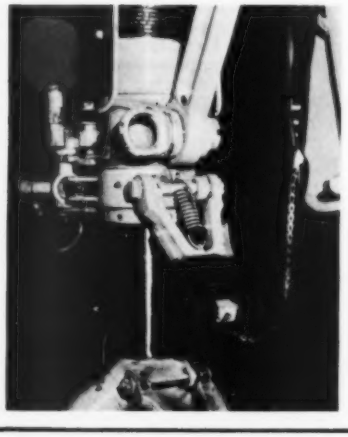
It serves as a reminder to plane captains to install the plug before towing with a tractor and also to hookup the nose fork steering when the gear pins are pulled. Notice that the plug is connected to the red warning flag on the nose gear.

The fork plug is easily fabricated and even easier to use. We are using aluminum stock but any material in the scrap bin could be utilized (even a piece of tubing).

Here's hoping someone will find it useful.

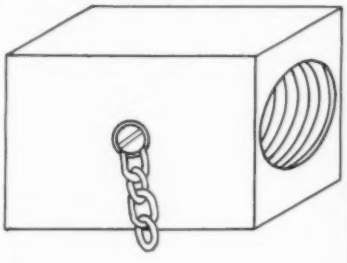
J. E. SERVICE, LCDR,
NAVAL AIR TEST FACILITY

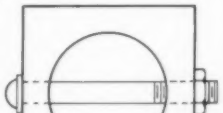
• **Thanks on behalf of A3D types.**

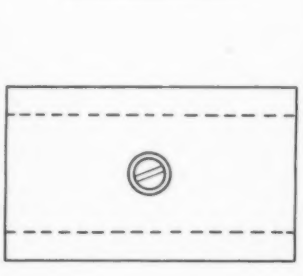


ENLARGED VIEW

A3D
STEERING FORK PLUG







Purposes and policies: APPROACH is published monthly by the U. S. Naval Aviation Safety Center and is distributed to naval aeronautical organizations on the basis of 1 copy per 10 persons. It presents the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders, or directives. Material extracted from

approach

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Flight Operations

Aero-Medical

Maintenance

Departments

Our product is safety, our process is education, and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Motivating

Reliability

Reliability is perhaps the most talked about subject and the most desirable objective in our missile and space programs. Appropriations groups worry about spending too much or too little money to achieve it. Systems engineers ponder long hours for all possible factors of failure. Project managers sweat out test after test. And the general public wonders why it costs so much to develop a single project in our defense program.

Involved are people, technology and hardware. Despite the obviously prime contribution of people, the human element is many times relegated to a secondary position with the argument that people naturally make mistakes and automated, inanimate, black boxes are the ultimate in reliability. Because equipment is no better than the people building it, regardless of perfection in design, one of the most critical elements in our missile and space activity is the human factor in reliability. As razor sharp alertness gives way to boredom in the routine of production, the human factor in reliability become a serious management problem. In our zeal to construct sophisticated hardware and expand the frontiers of science and technology, we forget about the basic problems of the basic ingredient of the entire operation—namely, people.

A high-level space scientist recently reported that the attitude of production workers was a major factor in improving reliability of ground support equipment and satellite instrumentation. Once a worker understood the cost involved, the importance of the mission, and the importance of his contribution, his attitude toward meeting specifications changed completely.

No longer did the worker consider himself to be an insignificant cog in a big machine, but a key person in a big team effort. He was important to the success of the project. If he failed, the whole project would fail. Accordingly he made that extra effort to assure his job was perfect. His job was more than performing a routine, and filling out the production sheet. He was helping to make history and no one man alone could do it. The worker's effort was just as important to success as the longest longhair. He took pride in his work, and wanted to do a good job, not because someone told him to do so, but because he convinced himself he should do so.

Significantly, this change in performance was motivated—not by threat, not by more money, not by tougher work rules—but by simply explaining the worker's position in the long list of people and operations necessary to achieve maximum reliability.

Pride of workmanship and a sense of responsibility are fast fading assets in our way of living and working. Our military programs are losing the very things which made it possible for this nation to grow.

Complacency in individual responsibility is deadly to self-motivation—and motivation is exactly what we need to improve reliability.—*Ground Support Equipment*

LIFT and DRAG

CIVIS AERIUS SUM

(I am a Citizen of the air)

As a professional pilot, I recognize my obligations:

1. To the public which entrusts its safety to my skill and judgment.

2. To my fellow pilots who mutually depend upon me to follow established good practice.

3. To my crew members who look at me to exercise my best judgment and leadership.

4. To my co-workers who constantly are striving for greater achievements and general over-all improvement in aviation.

5. To my organization which entrusts me, in the conduct of my flights, with moral and economic responsibilities.

To discharge these obligations, I will at all times observe the highest standards of my profession.

*I never will knowingly jeopardize the safety of a flight by undertaking a risk to satisfy personal desires, nor will I fly when my mental or physical condition might lead to additional risk.

*I will use all means at my disposal to assure the safety of every flight, both as to my assigned duties and those of my fellow crewmen.

*I will continue to keep abreast of aviation developments so that my judgment, which depends largely on such knowledge, may be of the highest order.

*My deportment, both on duty and off, reflects my respect for my profession and for my country, and it shall be such as to bring credit to both.

*I pledge adherence to these principles for the advancement of aviation and to further the dignity of my profession.

Ethics are not learned by teaching; they are inculcated by example and by experience. To a man of honor, "ethics come as naturally as good table manners."